EDITORS' PICKS **TOP 10 SCALE ARFs** page 28

MODEL Airplane NEWS

FLY LIKE A PRO

Secrets of basic aerobatics

Build a **Reno Mustang**

IN THE WORKSHOP

Tips to keep your engine cool

Model mods for easy transport

World's biggest **giant-scale** fly-in See page 34

WE REVIEW

- **Jodel Bebe**–park flyer with retracts
- **Corona**–electric helicopter
- **BobCat**–turbine trainer
- **Pete 'N Poke**–sport slow flyer
- **Sport CAP**–modern aerobat

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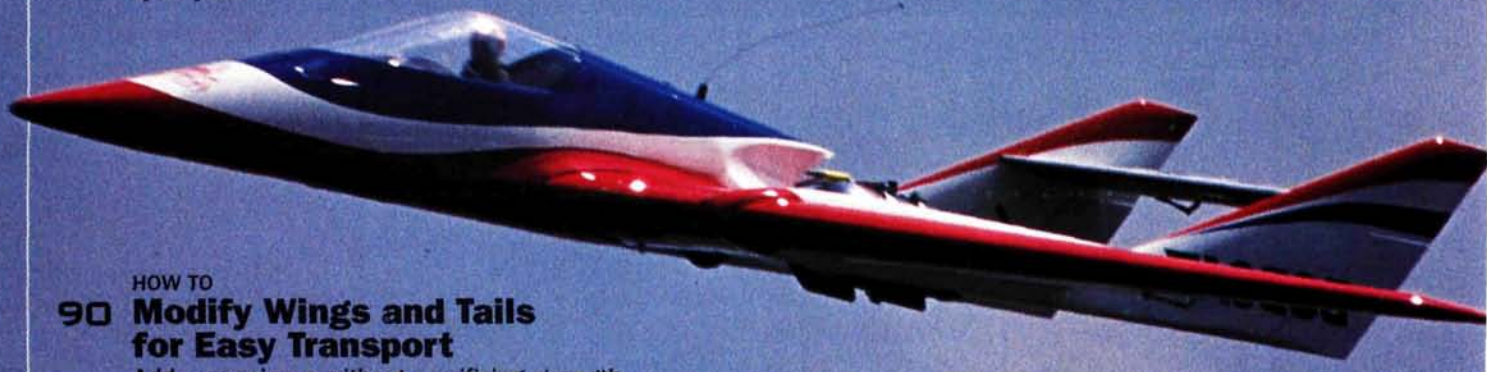
MODEL Airplane NEWS

SEPTEMBER 2002 VOLUME 130, NUMBER 9

ON THE COVER: Jerry Smith snapped these giant-scale aerobats hovering over the lake at the Triple Tree Airdrome, site of the 20th Annual Joe Nall Fly In. THIS PAGE: the turbine-powered Bob Violett Models' BobCat XL, reviewed by Frank Tiano on page 44 (photo by Debra Sharp).

FEATURES

CONSTRUCTION



COLUMNS

FLIGHT TESTS

DEPARTMENTS

Best scale ARFs

Here at *Model Airplane News*, we see dozens of great scale, **almost-ready-to-fly (ARF) models** up close and personal every year. Although our reviewers certainly enjoy building and flying all of the models we publish, a few planes stand out because of their exceptional scale outline and details, high-quality construction, parts fit and materials and terrific flight characteristics. These models represent the cream of the crop; they draw attention wherever they fly, and their manufacturers have set the bar for future ARF planes. Have you been looking for that perfect scale ARF model? In this issue, we've chosen our favorites from the past few years; turn to page 28 to see which models made our list and why.

This C-45 was built and flown by Paul Offermann of Moneta, VA. Powered by a couple of G-38s, it weighs 43 pounds and was built from a Ziroli plan.

JOE NALL FLY-IN

Contributor and photographer Jerry Smith was on hand to capture the action at this year's 20th annual **Joe Nall Giant-Scale Fly In**, at which more than 500 registered pilots gathered for some relaxed flying at one of the best sites in the country. Our cover image of dual aerobats hovering over a 50-acre lake at Triple Tree Airdrome was only one of this year's highlights; see Jerry's article on page 34 for more incredible photography. In fact, Jerry took so many great photos that we decided to post the rest of them as a Click Trip at modelairplanenews.com.

GET STARTED IN AEROBATICS

In this issue, contributor Dan Wolanski discusses the basics of **aerobatics competition** and explains how to interpret the internationally accepted lines, dots and triangles that make up Aresti symbols. Thanks to Dan's detailed explanation of the 2002 basic sequence, understanding aerobatics just got easier.

ELECTRIC MUSTANG

This month's featured construction article is a P-51 Mustang from prolific electrics designer Mark Rittinger. The plan features details for several military versions as well as a fast-back Reno Racer. This versatile, 42-inch-span model uses traditional wood building techniques and has foam-core wings. Designed to use the inexpensive Kyosho Magnetic Mayhem motor and Master Airscrew gearbox, both the racer and the military versions fly extremely well.

TURBINE TRAINER

If you've wanted to step up to turbine power but weren't sure which model to start with, Bob Violett Models has an answer: the **BobCat XL**. Reviewed in this issue by Frank Tiano, this well-engineered jet "trainer" has a wide flight envelope and features wooden tail and wing construction and a sturdy, molded-fiberglass fuselage for easy assembly.

NEW COLUMNIST

We welcome Bill Jensen as our new "Air Power" columnist. A veteran modeler and engine expert, Bill reviews the new **Megatech .61** this month; turn to page 124 to see how much horsepower this 2-stroke powerplant offers. Bill has several more review engines on the bench, so stay tuned for more "Air Power" columns; they'll be coming soon!

MODEL Airplane NEWS
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TOP GUNS

I loved the "Top Gun" article in your August issue, and I definitely need to go next year to see those scale beauties up close and personal. It's interesting that the turbine-powered jets and their pilots dominated the competition by winning every class they were in! It would be great to see more reviews of these high-end machines. Keep up the good work. [email]

MARK BEALS

Glad you enjoyed the article, Mark. Top Gun is certainly a must-see event, and turbine-powered models are constantly pushing the envelope in scale fidelity and sheer performance. If you're looking for a good entry-level jet, check out Frank Tiano's review of the Bob Violett Models BobCat in this issue. DS

BALANCING ACT

Which way should you laterally balance a profile plane with its engine mounted on the side of the fuselage? Should it be balanced through the fuselage centerline (as with any other plane), or through the engine's centerline? With the profile fuselage, the engine's centerline is offset about ⅜ inch. I have been told by some to balance the model at the fuselage centerline and by others to use the engine centerline. Which is correct? [email]

RICK CURRENT

Rick, laterally balancing a model is a good thing to do, but it isn't nearly as critical as balancing the model longitudinally, i.e., pitch-wise at the model's center of gravity. Having the lateral balance point off by a scant ⅜ inch is nothing to be worried about. Go ahead and balance the model at the engine's centerline; doing so will make the process much easier. I highly doubt that anyone would be able to tell the difference between that way or balancing the model on the fuselage's centerline. Unless you perform precision aerobatics, it just doesn't make that much difference. Go out, fly the model and be happy! GY

GLUING IN SERVOS?

When at the flying field the other day, I saw a fellow club member fly his backyard, foamie model, scale-looking Nieuport 28. I was horrified, however, to learn that the builder had glued his servos into place! Is this proper? From my very first days as an RC modeler, I have been told to properly install the rubber grommets, brass sleeves and servo-mounting screws. What gives?

GEORGE SCHULZ
Westminster, MD

George, it's true that in most cases, it is necessary to install servos with the required hardware and mounting screws. In the world of lightweight backyard flyers, however, that isn't always the case. Since there is little vibration in these electric-powered foam planes, rubber grommets aren't really necessary to protect the inner servo workings. Also, since weight is always an issue with these little flyers, using glue instead of screws saves a few grams. A good practice when gluing servos into place is to wrap tape around the servo case before applying the sticky stuff. That way, it will be a bit easier to remove the servo if you need to. GY

STAUDACHER COLORS

After reading Gerry Yarrish's "Field & Bench" report on the GiantScalePlanes.com Staudacher (April 2000), I really wanted one. Well, now I have one and it's ready to cover at last. I want it to have the Michael Goulian paint scheme—the same as that on Gerry's plane—because I think it's an impressive and striking use of color.

I have photos of the sides and top, but I cannot locate photos of the bottom of the plane. I would really appreciate any help you could give me. [email]

EDDIE A. PETERSON, JR.

Hello, Eddie; the Michael Goulian S-300GS Staudacher is indeed an attractive airplane. I wanted to model it long before the kit came out. I do have some photos that Michael sent to me when I wrote the article, and one of them slightly shows the underside of the wing.

The wing's underside is similar to the top in that it has a red leading edge area, but the pattern goes from the tip straight to the fuselage. There is no tapered inner area. Also, there are two thin black stripes aft of the red area. These are the same width as the single black stripe on top and are separated by a white area about equal in width to one of the black stripes. There are no logos on the underside. Hope this helps. GY

LOOKING FOR A STORCH

I am trying to find a plan to use to scratch-build a German Fieseler Storch observation plane. Do you have a plan for this aircraft, or do you know of a source? Any suggestions would be greatly appreciated.

HARRY M. PEITYRAL
Quebec, Canada

Harry, the Fieseler 156C Storch is one of the few aircraft we do not have an RC plan for, but we'll work on that. Bob Holman Plans Service does have a Storch plan, and it is a very nice scale project. Designed by Dennis Bryant, the Storch has a 94-inch span and is ideally suited to a .60 to .90 2-stroke engine. Bob Holman also has laser-cut parts for it and several accessories, including spring-loaded Oleo strut landing gear. You can reach Bob Holman Plans Service at (909) 885-3959; angelfire.com/ct/bhplans. GY

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NEW PRODUCTS OR PEOPLE hit the model airplane market all the time, so here's the inside source for what's hot and where you can get it. Every issue, we sift through product announcements, show reports, rumors and prototypes to let you in on the best and the latest. Remember, you saw it here first!

AIR SCOOP

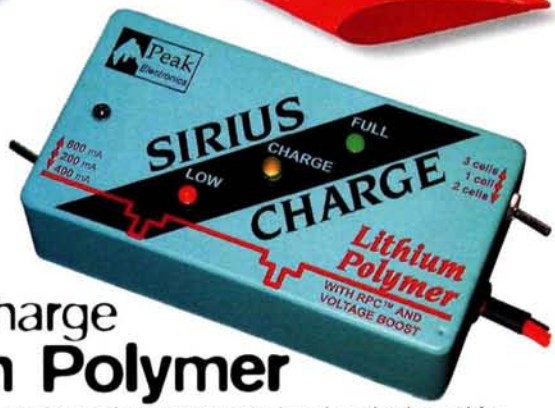
by the staff of Model Airplane News

SIG MFG.

Four Star .60 ARF

Sig's philosophy with this plane was to get you into the air as quickly and easily as possible—without taking shortcuts that sacrifice quality. This is a Sig model, and it maintains the standards that modelers expect from the brand: a solidly built airframe and Oracover film covering. It also includes a first-class hardware package: fuel tank, aluminum main gear, wheels, spinner, tailwheel assembly, pushrods and linkages. Also included are three decal sheets and a fully illustrated instruction manual. The critical specs: wingspan—71 in.; wing area—920 sq. in.; weight—7 to 8 lb. It requires a .60 to .75 2-stroke or a .65 to .90 4-stroke and a 4-channel radio with 5 servos. Firm prices hadn't been set when we went to press, but expect a street price of around $200.

Sig Mfg. (641) 623-5154; sigmfg.com.



PEAK ELECTRONICS

Sirius Charge Lithium Polymer

As the use of lithium batteries continues to grow, so, too, does the demand for an appropriate charger. Peak Electronics is meeting this demand with the introduction of its new Sirius Charge Lithium Polymer. This 12V input unit can charge lithium-ion, lithium-polymer and lithium-metal batteries. The current is selectable for 200, 400 and 800mA, and output is selectable for 1, 2, or 3 cells.

Peak Electronics (800) 532-0092; siriuselectronics.com.

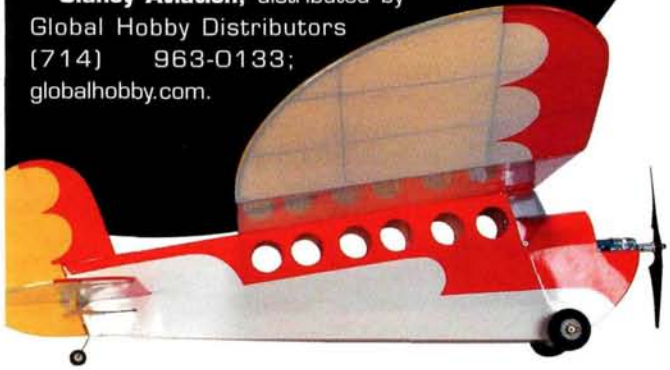
CLANCY AVIATION

ARF BEES

Arguably the most recognizable small models around, Andy Clancy's unique Bee designs will soon be available in ARF form! The diminutive 29-inch-span Yard Bee will be the first Clancy ARF release and will feature lightweight covering, foam tires, full hardware and a geared 280-size motor and propeller for around $79.99. For pilots who prefer glow power, the plane is easily adaptable to an .061, as the kit will come with an engine mount and instructions.

Soon to follow is the most popular Bee ever: the Classic Lazy Bee. This 40-inch-span ARF will come with directions for both Speed 400 electric and .15 glow power. Price to be announced.

Clancy Aviation; distributed by Global Hobby Distributors (714) 963-0133; globalhobby.com.



It's back!

TOP FLITE

GOLD EDITION

Beechcraft Bonanza

Top Flite's popular "Gold Edition" ⅛-scale, sport Beechcraft Bonanza is back in production. The Bonanza's D-tube wing construction with interlocking I-beams provides extra strength and enables automatic and precise alignment. With the exception of the aileron horns, all of the control linkages are concealed inside the model and are easily accessed through the removable tail cone. The kit includes all of the parts necessary to build either the F33A straight-tail or the V35B V-tail version. This IMAA-legal model has an 81-inch wingspan and weighs between 11 and 13 pounds. Top Flite suggests a .60 to .91 2-stroke or .91 to 1.20 4-stroke engine for power. The Beechcraft Bonanza sells for $219.99. If you missed it the first time, here's your second chance to own the V-tail classic.

Top Flite; distributed by Great Planes Model Distributors (800) 682-8948; greatplanes.com.

DYNAFLITE
FUN SCALE SE5a

Dynaflite's new 1/5-scale SE5a is sure to draw the attention of history buffs and scale enthusiasts alike. This IMAA-legal aircraft is a replica of the historic British WW I combat plane. It features all-wood construction and a straightforward assembly procedure. An ABS cowl, exhaust stacks, windscreen and pilot's headrest and decals all combine to create a true-to-scale Royal Air Force fighter. The cowl's front and bottom sections can quickly be removed for access to the engine, and after you've removed the wings, the landing gear can easily be reattached for transportation to the field. The SE5a has a 64-inch wingspan and requires a .61- to 1.20 2-stroke or a .91 to 1.20 4-stroke engine. It sells for $179.99.

Dynaflite; distributed by Great Planes Model Distributors (800) 682-8948; greatplanes.com.

MODEL ELECTRONICS CORP.
MARK V SOLDERLESS POWER TUBES

Simplicity and versatility are two of the most prized virtues in engineering—traits that the Mark V Solderless Power Tubes from Model Electronics Corp. (MEC) have in spades. Imagine battery packs that you can tear down, swap cells out of and rebuild inside three minutes using only a screwdriver—no soldering! Well, here they are; MEC's design uses two plastic endcaps with low-resistance contacts, two long screws to hold the caps in place and a preformed length of heat-shrink tubing to hold the cells. The cells slide into the heat-shrink tubing as if being loaded into a flashlight. The endcaps fit over the ends of the tubing to hold the cells inside, and the long screws are threaded into one cap, run along the length of the pack next to the cells and are then secured in the other cap. Very simple!

Packs come with 4 to 12 Panasonic 3000mAh NiMH cells, and you can buy the components separately, so you can build your own packs. How's that for versatility? Prices range from $42 to $102; kits (minus cells) cost around $20. These are must-haves for serious electric fliers!

Model Electronics Corp. (425) 255-4269; modelelectronicscorp.com.

WATTAGE
Tangent

Want a small model that's capable of big-time aerobatics? Look no further than the new Tangent from WattAge. This 31½-inch-wingspan, pattern-style plane is constructed of molded fiberglass with carbon-fiber reinforcement and factory-cut ailerons. The rudder, horizontal stabilizer and elevator have all been factory cut from foam. Powered by a Speed 370 motor with a custom gear ratio and prop (included), the Tangent comes standard with real clevises and horns, adjustable aileron connectors and a lightweight, steerable tailwheel assembly. Best of all, it can be yours for just $99.99.

WattAge; distributed by Global Hobby Distributors (714) 963-0133; globalhobby.com.

KAVAN
Ford Tri-Motor ARF

There's a lot to be said for a unique model, and that's exactly what this new Ford Tri-Motor from Kavan is. This 41¾-inch wingspan, semi-scale model is a highly detailed re-creation of Ford's famous three-engine airliner. The model has reinforced hollow-foam wings, and all of the main components come painted and ready for final assembly. Many of the components come already assembled, including the landing gear, the wiring harness for the multiple motors and the motor mounts. The Ford Tri-Motor comes with two Speed 280 motors and 5x3 APC props. It sells for $139.

Kavan; distributed by Hobby Lobby Intl. (615) 373-1444; hobby-lobby.com.

HOBBY ZONE

Fighterbird

From the folks who helped define "ready-to-fly" comes a whole new breed of backyard flyer. If you liked the Firebird and its successors, you'll love the newest addition to the family. The 42-inch-wingspan Fighterbird has the same great characteristics as the Firebird II, only larger and with an added bonus: it comes with an interactive combat module that can be attached to the bottom of the plane. When triggered, the module will shoot a sonic beam at an opposing Fighterbird. The module indicates that it has been hit by emitting a loud, sharp beep. That's right, folks—laser tag, backyard-flyer-style! Grab a friend and a couple of Fighterbirds, and get ready for some combat flying in your own backyard.

Hobby Zone; distributed by Horizon Hobby Inc. (217) 403-3279; horizonhobby.com.

BOB FIORENZE

T-38 Talon Scale Rims and Tires

Looking for a set of wheels for your latest scale project? Check out these new show pieces from Bob Fiorenze. Though they were designed specifically for the T-38 Talon, these one-piece aluminum main rims with integral brake drum will fit any jet or sport airplane with similar dimensions. Originally available as a set of three molded rims and tires, the one-piece rim/brake drum on the main wheels is now machined from aircraft-grade T-6 aluminum. Two aluminum main rims/brake drum and tires, plus one molded nose rim and tire can be yours for $150.

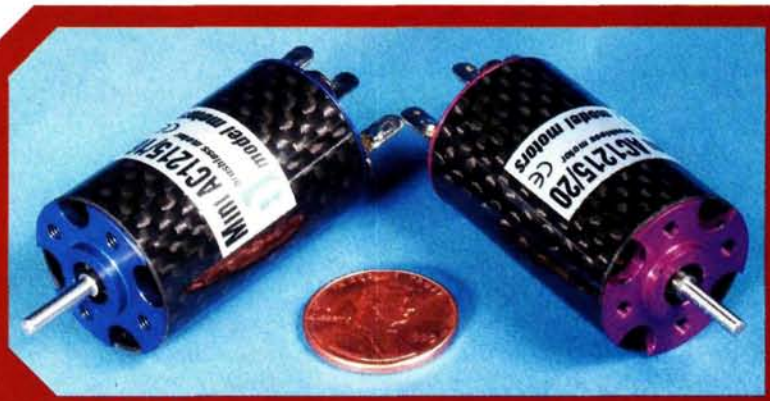
Bob Fiorenze (407) 673-9080; rcaviation.com/fiorenze.

GOLDEN HORIZONS

Raptor 30 UPGRADE PARTS

Helicopter enthusiasts everywhere are sure to take notice of Golden Horizons' new Raptor 30 upgrades. These CNC-machined items result in a rotor head that is very rigid and slop free. All parts, including the swashplate, seesaw mixing arms, washout arms, aileron L-levers and a one-piece stabilizer control-arm assembly, are made of aluminum and precision-ground steel. The stabilizer control-arm assembly has absolutely no flex and will last for many years. The swashplate has no plastic in it, and the pivot ball rides in a brass cup for long life. All of the parts have steel balls attached to them and are easily replaced if they wear out. Prices start at $59.99 for the swashplate, $39.99 for the stabilizer control-arm assembly and $24.99 for the seesaw mixing arms, washout arms and the aileron L-levers.

Golden Horizons (604) 331-2526; ghhobby.com.



AERIX HOBBY LOBBY

MINI BRUSHLESS MOTORS

What would you say if we told you that you could get Speed 480-size power from a motor that is the size and weight of a 280, has greater efficiency and draws fewer amps than any 480 on the market? You'd probably say what we said: "Gimme one!" Well, we'll do you one better: Hobby Lobby offers two versions, and that makes them ideal for just about any 10- to 30-ounce airplane. The Mini 7 handles 6 to 8 cells; the Mini 10 works on 7 to 10 cells. Geared 2.64:1, the Mini 7 can spin an 8.5x5 prop at more than 9,500rpm, drawing less than 13 amps. The Mini 10 (also geared 2.64:1) spins an 8.5x6 prop at nearly 9,000rpm, drawing less than 10 amps. Both are 48mm long and 22mm in diameter, with a 2.3mm prop shaft. Each weighs 1.7 ounces and uses a carbon-fiber outer casing. They work well with Hobby Lobby's Jeti 18-3P Brushless Motor Controller. Both versions cost $79.

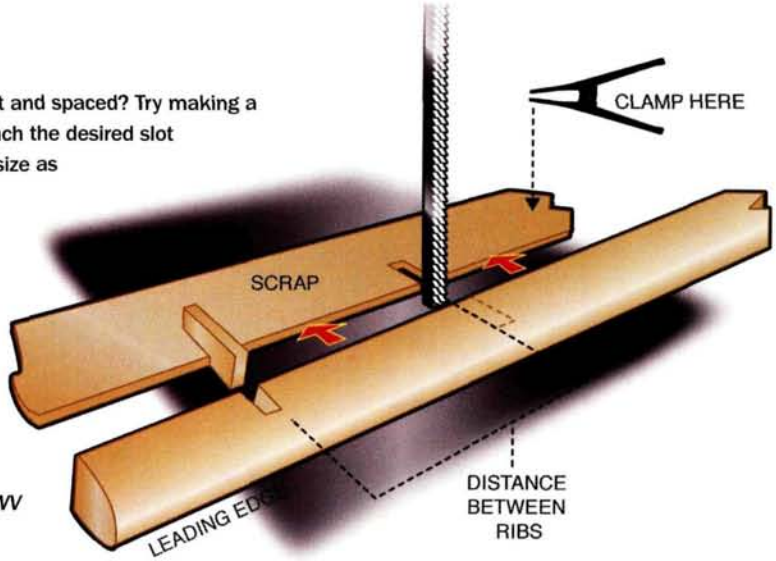
Hobby Lobby Intl. (615) 373-1444; hobby-lobby.com.

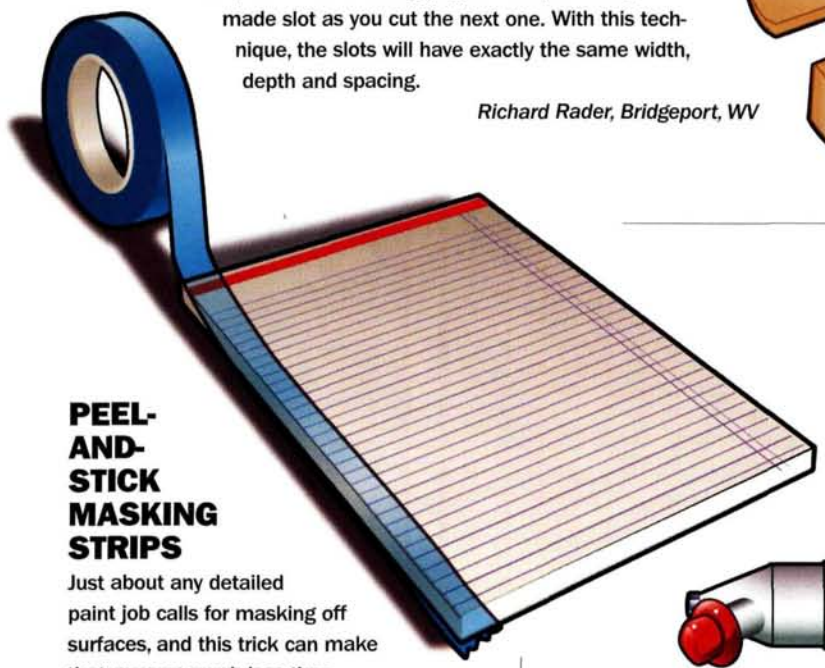
SEND IN YOUR IDEAS. *Model Airplane News* will give a free, one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Tips & Tricks." Send a rough sketch to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can neither acknowledge each one nor return unused material.

RIB JIG RIG

Having trouble getting your leading- and trailing-edge rib slots evenly cut and spaced? Try making a simple jig like this one. Stack two or three jigsaw blades together to reach the desired slot thickness. Next, take a piece of scrap wood and cut a slot of the same size as you want for your leading and trailing edges, and then insert a piece of scrap balsa to serve as an indexing peg. Measure the distance you need between ribs, cut a second slot, and insert your saw blades in this. Make the slot deep enough for the amount of blade that is exposed to equal the desired depth of your leading- and trailing-edge slots. Now use this jig to cut your slots one by one; move the indexing peg into the previously made slot as you cut the next one. With this technique, the slots will have exactly the same width, depth and spacing.

Richard Rader, Bridgeport, WV





PEEL-AND-STICK MASKING STRIPS

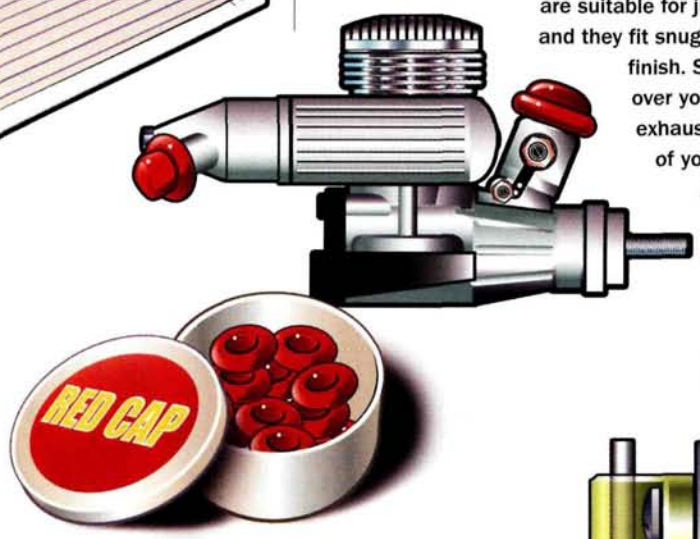
Just about any detailed paint job calls for masking off surfaces, and this trick can make that process much less time-consuming. Take a legal-size notepad and run a strip of masking tape down one edge of the top sheet of paper. When you need to mask off the next section, simply tear off the top sheet with the tape all ready to go. This makes long, smooth straight masking edges virtually effortless.

Ron Laumeyer, Inner Grove Heights, MN

NIGHT CAPS FOR YOUR ENGINE

Here's an easy way to protect your model engine when you store it for the night or for the season. "Red Cap" rubber caulking-tube caps are sold at many hardware stores and are an excellent means of keeping moisture, dirt and debris out of your engines when they aren't in use. The stretchy elastic caps are suitable for just about any application, and they fit snugly without damaging the finish. Simply press these caps over your carb intake and your exhaust outlet to seal both ends of your engine.

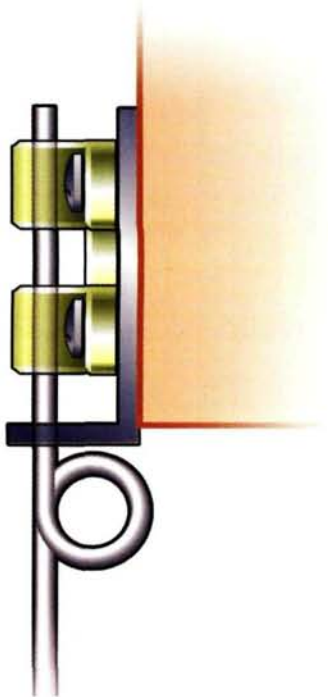
Manny Duarte, Everett, WA



DON'T GET YOUR NOSE OUT OF JOINT

We all aspire to flawless landings every time, but reality often intrudes, and our landing gear pays the price for our imperfection. Colorful landings can be especially hard on nose gear because the bearing blocks have to be mounted above the bottom of the fuselage. The wrong kind of jolt can easily bend the gear wire at the block instead of at the coil, where it is designed to flex. A simple solution is to use a piece of ¼x½x½-inch aluminum angle as a support bracket. Use a bearing block as a template to mark the locations in the bottom of the bracket where the gear wire will need to pass through, then use a drill press to make a 5/32-inch hole. Next, slide the wire and the bearing blocks into place as usual, and again, use the blocks as templates to mark the mounting holes, making sure the wire is straight. Drill these holes and install the assembly, positioning it so that the coil in the gear wire is as close as possible to the bracket. With this extra support, the gear wire will bend at the coil on a hard landing, making it much easier to straighten out.

Robert DeBoth, New Holstein, WI



SPRAY-ON TINTED WINDOWS

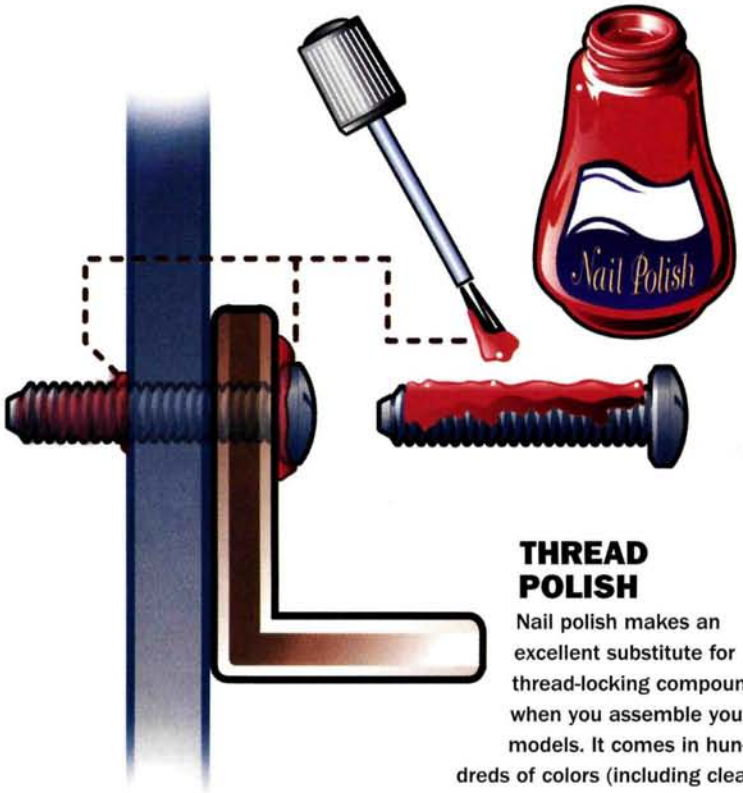
Here's a simple trick to produce nicely detailed tinted windows on your airplane. Cut some 1/16-inch clear plastic (or the window material supplied in your kit, if it is clear) to the required shape. Then spray the inside of the window with a thin mist of flat black paint. You can go thicker if you want the window to be completely opaque, and depending on the window size and shape, you may want to mask off the edges on the outside of the window to avoid overspraying. With the paint on the inside, the outside of the window will retain its glossy, glass-like finish.

Robert Schmidt, Liverpool, NY

GET YOUR FILL

Wallboard joint compound makes excellent filler for balsa and ply seams and joints. The premixed compound is easy to find in hardware and home-improvement stores and is very easy to work with. Very soft and powdery, it can be sanded more easily than the surrounding wood, and that makes for smooth, seamless joints. You can store it in any airtight container; film canisters and pill bottles work well. Give it a try; you'll be surprised how easy it is to use.

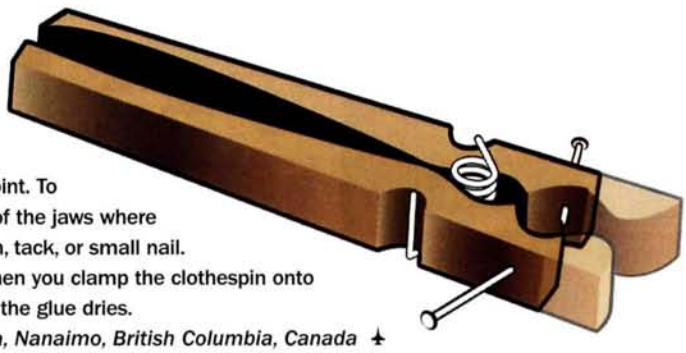
Ron Beroldi, Thermopolis, WY



THREAD POLISH

Nail polish makes an excellent substitute for thread-locking compound when you assemble your models. It comes in hundreds of colors (including clear), and it can be found for as little as 50 cents a bottle. Dab some on a screw's threads before you drive it into place, and then place another drop along the edge of the screw head where it contacts the surface of the wood. Some polishes are fuelproof and some aren't, so be sure to test before using your choice in places where it might be exposed to exhaust or fuel spills.

Bert Turner Jr., Springfield, MO



PIN CLAMPS

It can be tough to get a clamp to hold securely when you glue a shallow-angle joint. To make a clamp that won't shift, take a standard clothespin and cut off the ends of the jaws where the taper ends. Through each end, drill a small hole just big enough to seat a pin, tack, or small nail. Position the pins approximately 1/8 inch to the inside of the clothespin's pegs. When you clamp the clothespin onto the joint, the pins will bite into the wood and prevent the clamp from shifting as the glue dries.

A.B. Clozza, Nanaimo, British Columbia, Canada

PILOT PROJECTS

SEND IN YOUR SNAPSHOTS. *Model Airplane News* is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable but please do not send digital printouts. We receive so many photographs that we are unable to return them. All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in! Send those pictures to "Pilot Projects," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

Ruperto Asiatico, Virginia Beach, VA
F/A-18

Ruperto built this 10-pound, 55-inch-wingspan pusher jet from a G&P Sales kit. This fighter features a fiberglass fuselage; fully sheeted foam-core detachable wings; Spring Air retracts with functional gear doors; and functional air intakes that cool the internally mounted O.S. .91 engine and Mac tuned pipe. The scratch-built cockpit was precisely detailed with full front and side instrument panels, a heads-up display and an ejection seat. Ruperto painted the plane with LustreKote and handmade all of the markings from vinyl. According to him, the F/A-18 rockets around the sky and draws a nice crowd every time it flies. There's little wonder why. It certainly caught our attention.

Carlos Bolaños, Bogotá, Colombia
DE HAVILLAND TWIN OTTER

Carlos used the actual manual from the full-size plane and a 1/72-scale plastic MatchBox model to create this 86-inch-wingspan beauty. Now, that's ingenuity! Powered by two O.S. .40 FP engines turning 3-blade 10x7 props, the Twin Otter was constructed of balsa, plywood and fiberglass and covered in MonoKote. It's controlled with a 6-channel Futaba radio, and according to Carlos, it has excellent flight characteristics. Finished to resemble a Colombian commercial airliner, Carlos' de Havilland took top prize in a local competition. We're not surprised.

Ted Stickler, Bokeelia, FL
P-61 BLACK WIDOW

Check out this warbird! Built from a Don Smith plan, Ted's 1/8-scale P-61 Black Widow has a 99-inch wingspan and weighs 30 pounds. He says it took several years to complete; we say it was well worth the wait. Ted, a member of the Cape Coral R/Sea Hawks, finished his unique fighter with PPG automotive acrylic lacquer and included rivet and panel line detailing. The model is powered by a pair of Webra 1.20 engines and is equipped with flaps and retracts.

Mark Lamoreaux
Walton High School, Walton, NY
GREAT PLANES J-3 CUB

Last year, Mark sent us a photo of his aerospace students with their class project—a Tower Trainer 40. We told Mark that we'd love to hear what his students are up to this year. Here it is! This 1/5-scale Great Planes J-3 Cub is powered by an O.S. .52 FS engine and controlled by a 4-channel radio. According to Mark, the model flies great, and his fellow pilots at the Oneonta R/C Flyers agree that it looks pretty good, too. We second that!

Ron Colson, Loveland, CO, **SIG HOG-BIPE**

Our thanks to Ron for sending us this photo of his Hog-Bipe, which he built from a Sig Mfg. kit. Ron's model is powered by a Saito FA 100 GK engine turning a 14x7 prop and controlled by a Futaba 8U radio and five Hitec servos. Covered entirely in MonoKote, the Hog-Bipe is only the third model Ron has ever built—all were constructed from Sig kits. And, yes, that is Snoopy at the controls, and his trusty co-pilot, Woodstock.

Roger Trettsveen, Brottum, Norway
RAFALE

Apparently, in Norway, it's never too cold to fly. Roger built this 50-inch-wingspan Rafale from a Philip Avonds Scale Jets kit. The model weighs 12 pounds and is powered by an O.S. .91 engine with a Ramtec ducted fan. High-gloss car paint gives his jet its sleek finish. Roger's Rafale features Spring Air retracts and is controlled by a Graupner 12-channel radio. Roger says it flies very well. We think it's also quite a showpiece!

Mike Griffioen, Guelph, Ontario, Canada
GREAT PLANES EXTRA 300S

Mike began building this .40-size Extra when he was 15 years old. Now, at just 16, he's already at the controls. Built from a Great Planes kit, the model is powered by an O.S. .46 FX engine and controlled with a JR radio. Mike covered the aircraft with MonoKote and made the registration letters himself on the computer. He modified the kit by installing dual aileron servos instead of the single servo called for by Great Planes. According to Mike, his plane flies great at just under 7 pounds. Here, Mike's Extra is pictured with the full-size Extra that inspired his creation. Great job, Mike!

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John Klimesh, Mabel, MN
GREAT PLANES EASY SPORT .40

When John got his third Easy Sport .40, he decided to make some modifications, and the result is this great-looking, low-wing model. He began by inverting the fuselage and reshaping the wing saddle; then he made new slots for the vertical and horizontal stabs. In addition, John cut off the rear of the canopy and built a turtle deck in its place. Powered by a SuperTigre .61 and controlled by a Futaba radio and Hitec servos, John's Easy Sport features a Tru-Turn spinner, Robart strut covers, Hangar 9 3-inch wheels, a Williams Brothers pilot and a Klett tailwheel assembly. John covered the airplane with MonoKote and added a homemade fiberglass cowl for that perfect finishing touch.

Pedro Pedrossian Filho, Sao Paulo, Brazil
ME 323 GIGANT

According to Pedro, this plane may not be too much to look at, but "... it's a great scale project, a crowd-pleaser and a wonderful opportunity to fly a multi-engine plane." The full-size Gigant was originally built as a glider to carry troops, but later models were equipped with engines, enabling the aircraft to carry tremendous amounts of cargo. Pedro's Gigant is powered by six Speed 280 motors.

Larry Dawson, Belleville, IL
SIG FOUR-STAR .60

Larry really went to work on this Four-Star 60, and the result is a complete makeover. Modifications include the addition of a built-up balsa cowl, which, as you can see, really transformed the front of the model. He also added two inches to the rudder and installed the rudder servo in the tail; this balances the model and eliminates the need for lead. He powers his Four-Star with a Thunder Tiger .91, and it's covered with UltraCote. According to Larry, with the radical throws set high, the plane can be flown aggressively yet still remain tame. Nice job!

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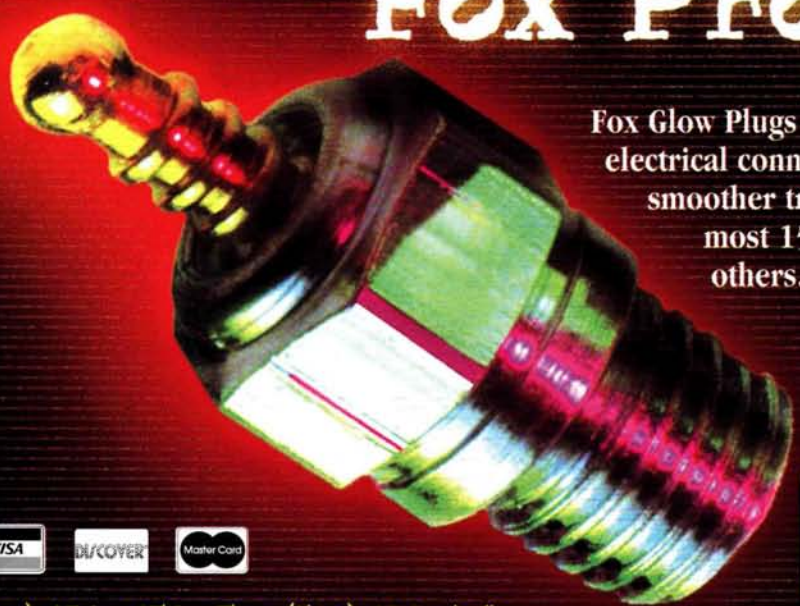

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Editors' PICKS

THE BEST

by the staff of Model Airplane News

In the course of reviewing the dozens of new models that come out every year, we frequently remark how far ARF technology has come in just a few years. That got us to thinking: if we had to pick our favorite scale ARFs, which planes would we pick? What started as an around-the-water-cooler conversation quickly developed into an idea for this feature story. We sat down, talked it over and started to compile a list.

Unlike in many previous comparisons, we intentionally have not limited the models to a particular style, size, or price. Nor have we limited ourselves to new models; we wanted to see how the tried-and-true designs stacked up against the cutting edge in ARF development. We laid down only three rules: to qualify for consideration, a model had to be reasonably true to scale; it must have been reviewed in *Model Airplane News* (we wanted to have enough experience with the plane so we'd be able to give it a fully informed endorsement); and last, it must have been in production at presstime (after all, it would be cruel for us to wax poetic about a model you can no longer buy!).

Then we whittled away until we had what you see here—a list of what we think are the best ARFs on the market, bar none. We focus on the highlights that make each stick out in our minds; for detailed specs and building tips, check out the reviews of the individual planes. We rate the planes in the categories that we feel are most important to scale ARF pilots, concentrating on aspects of scale realism, quality and flight performance. To level the playing field, we devised a "value" rating that encompasses the other scores and takes purchase price into account (see the "Report Card" on page 32). If you have been considering a scale ARF for your next project, this is a great place to start looking. If you haven't, see whether the next few pages will help you change your mind.

MRC/ALTECH EZ P-51D

PRICE: $360
WINGSPAN: 54.7 in.
ENGINE: .40 to .70ci

HIGHS
- Spectacular covering detail.
- Excellent flight performance.
- Very complete package.

LOWS
- Instructions are a bit rough.

VERDICT
The benchmark for scale covering detail has quality and performance to match.

FROM THE PILOT'S LOG

What grabbed my attention most about MRC's Mustang is the covering. We've remarked about the EZ line's innovative laminated Mylar-over-foam covering in previous issues, but this plane takes it to a new level. The brushed-aluminum finish, with its ultra-realistic weathering, rivets, warning labels and so on, is just amazing for a mass-produced model. The beauty isn't just skin-deep, either; underneath is a well-crafted P-51 that gives you a lot for the money (including retracts). *—Matt Boyd*

GIANTSCALEPLANES.COM STAUDACHER GS 300

PRICE: $599
WINGSPAN: 90 in.
ENGINE: 3.7 to 4.2ci

HIGHS
- Superior flight characteristics.
- Easy to set up plug-in wings.
- Smooth, flawless covering.

LOWS
- Instructions are sparse.

VERDICT
Unlimited fun from this unlimited aerobatic giant.

FROM THE PILOT'S LOG

When it comes to giant-scale aerobatics, the red, white and black Staudacher GS 300 from Giantscaleplanes.com is a 90-inch showstopper. The GS 300 was introduced in an almost-ready-to-cover version, but it is now available as an ARF and is one of several giant-scale aerobats available from this company. Professionally hand-crafted of balsa, foam and plywood, the Staudacher is strong where it needs to be and has a modest wing loading for its size. For sport aerobatics or full-blown 3D maneuvers, the GS 300 delivers. *—Gerry Yarnish*

SCALE ARFS

We fly 'em before you buy 'em!

GREAT PLANES PIPER J-3 CUB

PRICE: $190 (without floats), $45 (float kit)
WINGSPAN: 81 in.
ENGINE: .40 to .70ci

HIGHS
> Unflappable, scale Cub flight manners.
> Lots of plane for the money.
> Completeness of kit and available floats.

LOWS
> Strut hinges are weak.

VERDICT
This Cub looks good and handles great on land or sea and in the air.

FROM THE PILOT'S LOG

A Cub is like a worn old pair of slippers; it isn't flashy, but you'd be hard-pressed to find a more comfortable design. And when you model a plane that's as universally recognized and revered as the J-3 Cub, you'd better get it right. Great Planes did, and that is why it made our favorites list. Everyone is impressed with the fabric covering, and I really like all the goodies that come with the kit—not to mention the optional floats, which were specifically designed for it. *—Jaime Lagor*

YELLOW AIRCRAFT SUKHOI SU-31M

PRICE: $398
WINGSPAN: 72.5 in.
ENGINE: 1.20 to 1.80ci

HIGHS
> Top-grade materials and construction.
> Flies like a Sukhoi.
> Authentic Sukhoi looks.

LOWS
> Large cowl requires more mounts than are supplied.

VERDICT
If quirky looks and ultra-performance are your thing, you can't do better than this.

FROM THE PILOT'S LOG

Beauty is in the eye of the beholder, and when you behold the Yellow Aircraft Sukhoi whirling and spinning through unlimited aerobatic maneuvers, you'll never again disparage it for its "distinctive" style. Personally, I like its "anti-cool" character, and no one can knock its quality or its performance. *—Matt Boyd*

ARIZONA MODEL AIRCRAFTERS FOKKER DR.1

PRICE: $425
WINGSPAN: 62 in.
ENGINE: .46 to .56ci

HIGHS
> Nice fabric covering.
> Lots of scale accessories included.
> Distinctive style and character.

LOWS
> Rigid landing gear.

VERDICT
Highly detailed and well-executed Great War fighter.

FROM THE PILOT'S LOG

We all have a little Red Baron in us, don't we? Well, I certainly felt like strafing the trenches when Arizona Model Aircrafters brought out its new ARF triplane. Finished in a bright red fabric covering, the Dr.1 comes complete with machine guns, a painted cowl and vinyl decals. Just add your favorite engine and radio, and you're ready for that next dogfight! From its excellent construction that uses laser-cut parts, its accurate scale outline and its impressive flight characteristics, the Fokker Dr.1 delivers lots of charm and character. *—Debra Sharp*

GREAT PLANES TIGER MOTH

PRICE: $300
WINGSPAN: 71 in.
ENGINE: .61 to .91ci

HIGHS

> Kit comes with all the hardware, including flying wires.

> Remarkably scale-like flight performance.

> High-quality materials and workmanship.

LOWS

> Instructions not clear on top wing assembly.

VERDICT

True-to-scale Tiger Moth lines and relaxing bipe performance make this one an easy favorite.

FROM THE PILOT'S LOG

I like biplanes. I like how they look and how they fly. I really like how this Tiger Moth captures both characteristics in a manner that is so true to scale. You know Great Planes will get the big things right, but the little details are what really make this plane stand out: you can spend 5 minutes just admiring the flying wires. Some might dismiss that kind of thing as window dressing, but it's what gives this model the authenticity that sets it apart. *—Jaime Lagor*

KYOSHO GEE BEE Z .40

PRICE: $250
WINGSPAN: 56.5 in.
ENGINE: .40 to .53ci

HIGHS

> Beautiful fiberglass fuselage, cowl and wheel pants.

> Faithful scale rendition of the Gee Bees distinctive look.

> Surprisingly refined handling and aerobatics capability.

LOWS

> It's still a Gee Bee, so pay attention during landing.

VERDICT

Nothing looks like a Gee Bee, and with this model, you don't have to sacrifice performance for style.

FROM THE PILOT'S LOG

"That's an *ARF*?!?" Hearing that exclamation and seeing the crowd that the nothing-else-even-remotely-like-it style draws at the field is the coolest thing about Kyosho's Gee Bee. Everybody smiles when they see it; the expression turns to admiration when they check the fiberglass fuselage up close. Then you knock their socks off by displaying the Gee Bee's impressive aerobatics repertoire. Best of all, you can have one of your own ready in a day or two. *—Debra Sharp*

DAVE PATRICK MODELS ULTIMATE BIPE

PRICE: $400
WINGSPAN: 60.5 in.
ENGINE: .90 to 1.20ci

HIGHS

> Unparalleled aerobatic capability.

> Workmanship is outstanding.

LOWS

> Pushrod exits need to be cut.

VERDICT

I think the Ultimate Bipe is one of the best ARFs ever built.

FROM THE PILOT'S LOG

I can easily say that this is the best flying model I have ever built! Considering that the Ultimate Biplane comes with its engine cowl, cabane struts and canopy already installed and its wings are both one piece, I found it hard to fault this kit in any way. In the workshop and at the flying field, this model gets very high marks for quality of materials and hardware as well as craftsmanship. Add an instruction manual that is as good as they get, and you have the best ARF ever. *—Gerry Yarrish*

GREAT PLANES
RYAN STA

PRICE: $350
WINGSPAN: 82 in.
ENGINE: 61 to 1.20ci

HIGHS
> Eye-catching scale appearance.
> Nice mix of stability and aerobatic performance.
> Well-designed and executed.

LOWS
> No tailwheel mounting plate.

VERDICT
A majestic Golden Age classic that does just about everything well.

FROM THE PILOT'S LOG

For years, the only way you could own a Ryan STA was to scratch-build one or to locate the long-discontinued Sig Mfg. kit. And even if you did find one, it took months to assemble, finish and paint. When Great Planes introduced the Ryan ARF, people stood up and took notice. From its distinctive engine cowl and wheel pants to its bold underwing checkerboarding, what's not to like about this Golden Age icon? Add high-quality construction and a flawless MonoKote finish, and you have a new icon for the Golden Age of ARFs! —*Gerry Yarrish*

KYOSHO
SPITFIRE

PRICE: $170
WINGSPAN: 56.7 in.
ENGINE: .40 to .56ci

HIGHS
> Exceptional flight characteristics at all speeds.
> Authentic scale profile and camouflage covering.
> Excellent value.

LOWS
> Pushrod exits need to be cut.

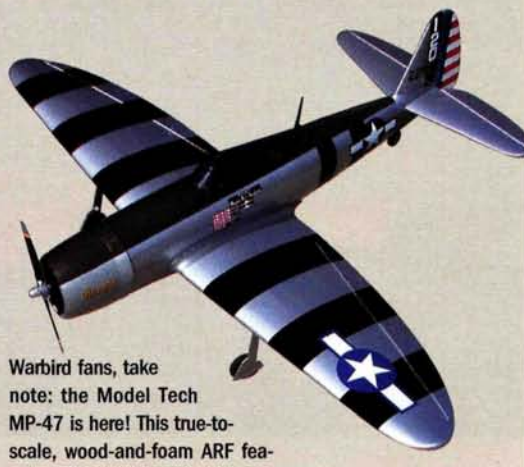
VERDICT
Among the crowded 40-size ARF warbird segment, this Spitfire's performance puts it in a class by itself.

FROM THE PILOT'S LOG

This plane is a sheer joy to fly. It is balanced at any speed and through any maneuver; this is the sort of plane that makes just about any pilot feel like an ace. That the Spitfire comes fully dressed in a very scale-looking camouflage covering—with its many markings and panel lines—is a welcome bonus, but even if it had a plain-Jane covering, its superb performance and bargain price would make it a winner. —*Rick Bell*

ON THE HORIZON

We recently received these planes for review, and they looked too good to be omitted from the guide. We'll report fully on these exciting ARFs in future issues.



Warbird fans, take note: the Model Tech MP-47 is here! This true-to-scale, wood-and-foam ARF features a 67-inch wingspan and requires a .60 2-stroke to 1.00 4-stroke for power. The warbird includes a painted fiberglass cowl, retractable and fixed landing gear and an aluminum spinner hub.

Mustang fans won't be left out of the large-scale ARF warbird scene, either. Hangar 9's .60-size Mustang is perfect for that 4-stroke you have hanging around. Beautifully constructed and covered in UltraCote, the classic fighter includes installed retractable landing gear.

Lanier RC continues the large-scale aerobatic tradition with this 96-inch-span Laser 200. Built of precision-cut balsa, plywood and spruce, the ARF Laser also includes a painted fiberglass cowl. Powered by a 3.2 to 4.2 2-stroke engine, the Laser weighs between 17 and 22 pounds.

SIG MFG. CAP 231EX

PRICE: $350
WINGSPAN: 73 in.
ENGINE: 1.20 to 1.50ci

HIGHS

> Solid, responsive handling.

> Good-quality hardware and painted parts.

> Excellent instruction manual.

LOWS

> Servo hatches are prone to warping.

VERDICT

Sharp-looking, simple to build and very capable in the air—a good aerobatic trainer.

FROM THE PILOT'S LOG

Of all the almost-ready-to-fly CAPs I've flown, the Sig CAP 231EX is a standout. Its solid, responsive flight characteristics are noteworthy. I firmly believe that its airfoiled tail feathers contribute to its handling, but what really appeals to me is the color scheme. The overall bright-yellow airframe with its dark accents makes this model prominent at any flying event. Though the scheme looks difficult to apply, Sig did an outstanding job of simplifying this demanding task. *—Rick Bell*

REPORT CARD

Rather than just rehashing the nuts and bolts of our previous reviews, we thought we'd try something a bit different and grade each plane in categories we feel are most important to scale ARF buyers. By doing this, we hope to provide you with some sort of comparison of fundamentally different models. Now, this is by no means scientific; these are purely subjective grades based on our impressions of the models. We didn't always agree; when there was a dispute, we averaged the grades from the editors involved. At the end, we averaged all the category scores to produce an overall grade for each model.

MODEL	REVIEWED	BUILD QUALITY	FINISH QUALITY	CONTENT	SCALE APPEARANCE	FLIGHT PERFORMANCE	BUILDING DIFFICULTY	VALUE	AVG.
> Dave Patrick Ultimate Bipe	8/01	A+	A	A+	A	A	A	A	A
> Kyosho Gee Bee Z .40	5/02	A+	A	A+	A	B-	A	A-	A
> Yellow Aircraft Sukhoi SU-31M	5/01	A	B+	A	A	A+	B+	B+	A-
> Great Planes Ryan STA	10/01	B+	B+	A	A	A+	B	A	A-
> Kyosho Spitfire	11/00	A	A-	A	B+	A-	B-	A+	A-
> Arizona Model Fokker Dr.1	6/02	B+	A	A+	B+	B	B-	A	A-
> Sig CAP 231EX	1/01	B-	B+	A	A	A	B	B+	B+
> Great Planes Tiger Moth	3/02	B+	B-	A+	B+	A	B-	A-	B+
> Great Planes Piper J-3 Cub	7/01	C	B	A	B+	B+	B+	A+	B+
> MRC/Altech EZ P-51D	9/01	B+	A	A	B+	B	C	B-	B+
> GSP.com Staudacher GS 300	4/00	B	A	B-	B	A-	B	C	B

RESULTS

Unanimously, we chose the Dave Patrick Ultimate Bipe as our overall favorite, and Kyosho's fabulous Gee Bee keeps things interesting in second place. Both averaged an "A"; the Ultimate ranked slightly higher, but the difference was too small to be seen in letter grades. The others are listed in the order in which they finished in our scoring. We were surprised at just how close the results were—proof that all of these ARFs are great, and that any one would make a worthwhile addition to your squadron.

Arizona Model Aircrafters *(480) 348-3733; arizonamodels.com.*

Dave Patrick Models *(815) 457-3128; modelmagic.com.*

Giantscaleplanes.com *(610) 282-4811; giantscaleplanes.com.*

Great Planes Model Mfg. Co. *(800) 637-7660; greatplanes.com.*

Hangar 9; *distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.*

Kyosho; *distributed by Great Planes Model Distributors, kyosho.com.*

Lanier RC *(770) 532-6401; lanierrc.com.*

Model Tech; *distributed exclusively by Global Hobby Distributors (714) 963-0133; globalhobby.com.*

MRC/Altech *(732) 225-2100; modelrec.com.*

Sig Mfg. Co. Inc. *(515) 623-5154; sigmfg.com.*

Yellow Aircraft Intl. *(781) 674-9898; yellowaircraft.com.*

20th Annual JOE NALL FLY IN

A giant-scale extravaganza
with Southern hospitality!

by Jerry Smith

FOR THE 20TH ANNUAL JOE NALL GIANT-SCALE FLY IN, hundreds of giant-scale modelers converged on the Hartness Triple Tree Airdrome near Woodruff, SC. For 17 years, the event was held at Hartness Field (Pat Hartness' estate) in Greenville, SC, and during its three years at the Triple Tree site, it continues to get bigger and better. The fly in is sponsored by the Confederate Air Force (International Miniature Aircraft Association, Chapter 94) and is an AMA-sanctioned event. This year, it was co-CD'd by Mike Gregory and Bob Sadler; Bob was also the tireless announcer throughout the weekend. Talk about a well-oiled mouth! The FAA was there because Matt Chapman performed full-scale aerobatics during the noon shows.

Jim Mahoney (Lakeland, FL) built this lovely Waco SRE from a plan. Covered with UltraCote, it weighs 22 pounds and uses a G-38 for power.

7

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5

6

1. *Ray Myers (Findlay, OH) did up his Balsa USA Stearman Black Baron in grand style. Powered by a 3W-140, it moved out well for a 40-pound bipe.* **2.** *Folks; this is the real thing! Matt Chapman flies a grand photo-pass flyby (a treat spectators enjoyed at noon on Friday and Saturday).* **3.** *A beautiful display in the pit area; many were ARFs. There seemed to be no end to the remarkable craftsmanship.* **4.** *Author Jerry Smith poses with Matt Chapman's full-size CAP 232.* **5.** *Tony Greco (Cape Coral, FL) spent many hours on this PCM L-1011 kit. It's powered by a Ram 750 turbine and weighs 28 pounds, but it didn't get off the ground because its wheels were too small for the grass runway.* **6.** *John Kohler (Marlton, NJ) does a flyby with his six-year-old AT-6, which he built from a Ziroli plan. Powered by a G-62, it features B&B smoke and retracts.* **7.** *Quique Somenzini flew an exciting demo flight with his F3A world-class pattern plane. Warren Thomas carries the airplane after the demo.*

TRIPLE TREE AIRDROME HISTORY

It had become clear that the Joe Nall Fly In in Greenville, SC, was in trouble; local residents were complaining, and the Greer Airport landing air space was right over the flying field. The Greenville site was also overcrowded, so more than five years ago, Pat Hartness purchased the 400-acre site that is now known as the Triple Tree Airdrome.

The grand entrance to the Triple Tree Airdrome. Many passed through this arch to be a part of the largest IMAA event in the world.

Two years of hard work went into developing the land before the first Fly In could be held there. Pat and Eddie Clark spent many hours moving thousands of yards of dirt, damming a small, spring-fed creek to form a 50-acre lake and bringing in electricity and water service. The entrance road and runway were graded, and the site was seeded for grass. A large gazebo forms the focal point, much as it did at the former site.

The new site was first used in May 2000; it was a little rough around the edges and not quite ready for a big event, but things went well. Pat and his crew learned firsthand what was needed to improve the venue and took note of it. In 2001, we saw improvement: the entrance road (Don and Clara Lowe Blvd.) had been rerouted, and the hillside had been terraced to better accommodate RVs. More trees had been planted behind the flightline, and the runway had been lengthened. The construction of a monumental arch at the front entrance had also been started. By 2002, still more improvements had been made: the hillside terracing had been enlarged to provide even more RV parking; the runway had again been improved and reseeded; more trees had been planted along the entrance road, and a shower building with a workshop in front had been completed just in time for this year.

All of this came about because Pat Hartness wanted to provide a location in which RC'ers would be able to come together to meet, fly and talk over old times. Pat is also extremely interested in bringing youth into the hobby. For providing one of the best RC flying facilities in the U.S. and for all that he has done for the hobby, Pat deserves our thanks; we are very lucky to have such a man as a benefactor.

Other events that will be held at the Triple Tree Airdrome in 2002 are: the First Annual Triple Tree Pattern Classic (June 29-30); the Don Lowe Masters (September 10-14); the Youth Challenge (early October); and the Triple Tree Aerotow (October 18-20).

I have attended for many years and have to say that it is, without a doubt, the largest gathering of giant-scale airplanes anywhere in the world. It is the greatest model-aviation spectacle you will ever see! By Saturday, 515 pilots were registered, the flightline was more than half a mile long and there were more Porta-Johns at the event than there were pilots at the first Fly In 20 years ago.

A typical day went like this: at 9:30 a.m. pilots' meeting; then open flying until noon; noon—demo flying starts and lasts for about 2 hours; after that, it's open flying until dark, when the night fliers take over.

Matt Stek's 40-percent, DA 150-powered Carden Extra 330s earned him first in Aerobatics at the Joe Nall Fly In and third in MonoKote at Toledo. Great work, Matt!

<< THE FIRST LADY

The 2002 Joe Nall Award was presented to Ginger Foster; she is the first woman to earn the trophy! Although Ginger is not an active RC'er, she has been at all the Joe Nall events and is consistently willing to help behind the scenes; she has always been there when needed most. Ginger is a most deserving recipient of this award.

GLAMOROUS GLENNIS AND FERTILE MYRTLE

B-29 builder Dan Stevens (left) and Mac Hodges shake hands before their second flight.

On Oct. 14, 1945, USAF Capt. Charles (Chuck) Yeager flew the X-1 faster than the speed of sound (670mph); it was the first human-piloted aircraft to reach that plateau in controlled, level flight. Three X-1s were built by the Bell Aircraft Co. for the USAF and the NACA. The third was destroyed in a fire before it was ever flown.

The X-1, nicknamed "Glamorous Glennis," was carried under the belly of a Boeing B-29 Super Fortress, nicknamed "Fertile Myrtle," from where it was drop-launched at 21,000 feet. Fertile Myrtle made more than 135 drops during the X-1's test phase and proved to be a reliable carrier. An interesting note is that in order to attach the X-1 to the B-29's belly, the X-1 had to be placed in a pit. The B-29 was then backed over it, and the X-1 was hoisted up and secured. There was very little clearance between the X-1 and the runway.

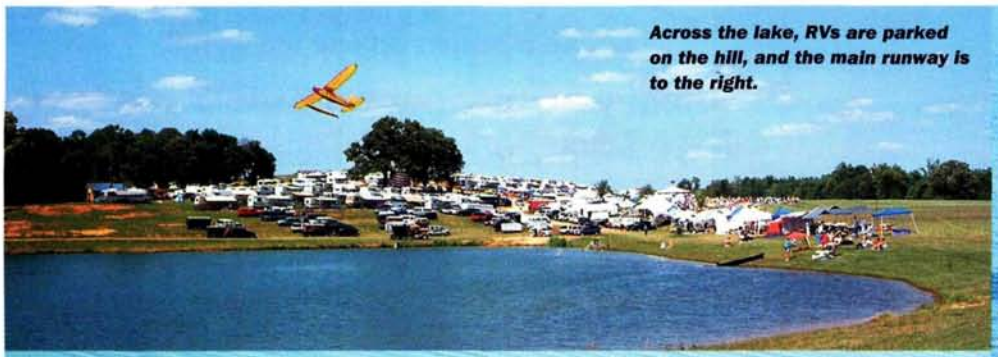
Many will remember the demise of Mac Hodges' older B-29 at last year's Joe Nall Fly In. A wing panel collapsed, and the veteran Super Fortress (more than 10 years old), was destroyed. After much consideration, Mac Hodges and Dan Stevens decided to build a new one.

The new B-29, built by Dan, is 25 percent larger than the previous model. The airframe is made entirely of foam sheeted with balsa and covered with ¾-ounce fiberglass cloth. It is built in ⅛ scale, has a 20-foot wingspan and weighs 98 pounds ready to fly. The Super Fortress is powered by four ZDZ 80cc gas engines swinging 26x10 props.

Controlled by a 10-channel radio, each removable wing panel has a receiver with its own power supply that controls the aileron, engine throttle and engine cutoff for that particular wing panel (all engines can be cut off manually or by radio). This eliminates the need for multiple servo connections when the wing is installed. In the fuselage, there are two more receivers (with power supplies) that control the elevators, rudder, throttles (for the two inboard engines), the retracts and the nosewheel steering. In all, four receivers are used. There are no flaps to slow it down; the model doesn't need them because of its light wing loading.

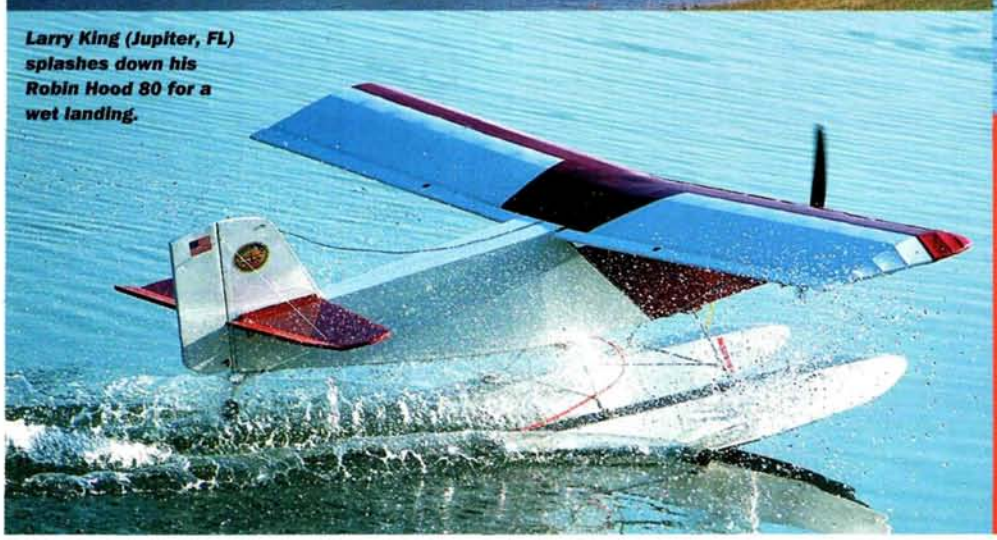
For a larger B-29 carrier, the X-1 model size had to be increased by 25 percent. Unlike the X-1's placement on the full-size Glamorous Glennis, the model X-1 is carried under the wing next to the fuselage. It is released at a high altitude and glides down toward the ground; when it is very close to the runway, the model's rocket engine is fired and it's on its way!

Dan built the B-29 in eight months, but the new X-1 required more of his time. For re-creating a milestone in aviation history and for giving pleasure to so many modelers who have seen these models perform, Mac and Dan are to be congratulated.



Across the lake, RVs are parked on the hill, and the main runway is to the right.

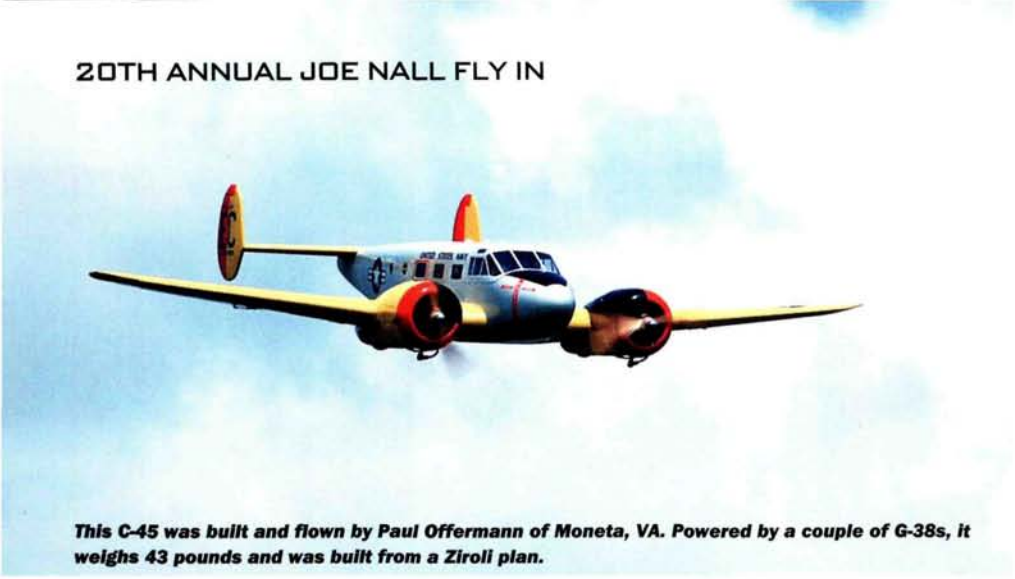
Slick Larsen (Marietta, GA) loves to fly off water. Here's his ½-scale Super Cub taxis in. It features Balsa USA floats and is covered with Siconite and dope—the old-fashioned way (at 84 years of age, Slick can do what he wants!).



Larry King (Jupiter, FL) splashes down his Robin Hood 80 for a wet landing.

WET WINGS

The site has a beautiful 50-acre lake for float flying. Phil Kimbrell of Charlotte, NC, took care of the lake frequencies so there wouldn't be any radio interference with those who flew from the main runway. There weren't as many float flyers this year as there were in 2001, so if you come next year, bring a floatplane.



This C-45 was built and flown by Paul Offermann of Moneta, VA. Powered by a couple of G-38s, it weighs 43 pounds and was built from a Ziroli plan.

On Friday and Saturday, the noon show included Matt Chapman and his full-size, unlimited aerobatic CAP 232. This guy lets it all hang out! Some of his maneuvers ended well below the treetops, and he was

It's tail-dipping time! The aerobatics pilots just couldn't resist. No mishaps, but we were waiting ... not hoping!

HALF-TIME ANTICS

The noon demo flights are always interesting to watch. Jeff Holsinger performed low passes and thrilled us with the speed of his turbine-powered "Hot Spot" jet. Demonstrating his commanding piloting skills, four-time Tournament of Champions winner Quique Somenzini put on a great show with his artistic maneuvers set to music. I had never seen many of his maneuvers before. Bobby Poston, commander of the Southern Scale Warbirds Association, lined up warbirds that flew low strafing missions and flybys for almost an hour. Mac Hodges thrilled us with the big B-29. First, he released a scale model of Chuck Yeager's bright orange X-1 rocket plane, and then he put his giant Super Fortress through maneuvers such as spins, rolls and inverted flight—all very close to the ground! Cary Lingo flew his impressive triple-tail Constellation, which was all dressed up in new paint.

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HORIZON HOBBY

out of sight for a second or two; it was scary, but impressive! Matt is a world-class aerobatics showman, and his performance makes him look as if he's taking big chances, but that's all part of the show. After landing, Matt held a question-and-answer session.

On Friday evening, well-known Atlanta businessman Paul Epps arrived at the flying field in his Pilatus turbo prop; he gave an interesting slide show on his attempts to recover the P-38 Lightnings that are buried in ice in Iceland. Some parts were recovered, but not an entire airplane.

Time is set aside on Saturday for the presentation of special non-competitive, traveling-trophy awards. The Bob Smith Trophy is awarded for graceful and realistic flying; the winner is chosen by the past recipients. This year, it was presented to Bobby Poston of Mt. Juliet, TN, by past recipient Arnold Marcus.

Nick Capone of Miami, FL, flew this great-looking P-47; made from a Meister kit, it's powered by a Brison 5.8.

CHOW TIME

The final highlight of the event is the Saturday night barbecue; it is a Joe Nall tradition and is always well attended. This year, approximately 1,000 modelers and their wives and children came together to meet and eat with friends and discuss the event's happenings. A bluegrass band added to the festivities; it was one, big, happy gathering.

A special thanks to Pat Hartness, Eddie Clark, contest directors Mike Gregory and Bob Sadler, Kirby McKinney and all the others who worked behind the scenes and helped make the weekend possible. The staff did an excellent job and handled it very professionally. If you haven't ever attended the annual Joe Nall Giant Scale Fly In, then you have missed a big slice of RC modeling fun. Plan to attend next year; it always happens in the middle of May. See ya there!

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These planes feature built up balsa and ply fuselages, sheeted foam wings, fiberglass cowl-wheel pants-and (on some models) wing fairings, all composite landing gear, tinted canopies, real vinyl graphics, and most utilize a two piece wing construction. The glass parts are painted with a very high gloss, detailed, automotive type finish. We have increased the control surface deflection area in order to maximize the 3D inputs. The final outcome is an exceptional 3D performance. We give you the option to mount the servos in the tail, or in the supplied fuselage servo tray in order to obtain a perfect center of gravity without adding additional weight. A complete hardware package with the exception of a spinner is included in the kit. Finally, we put a lot of effort into the packaging of the model. All of the pieces are foam wrapped and bagged to insure safe delivery and to protect the finish.

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3 Servo Tray is $54.99
4 Servo Tray is $69.99

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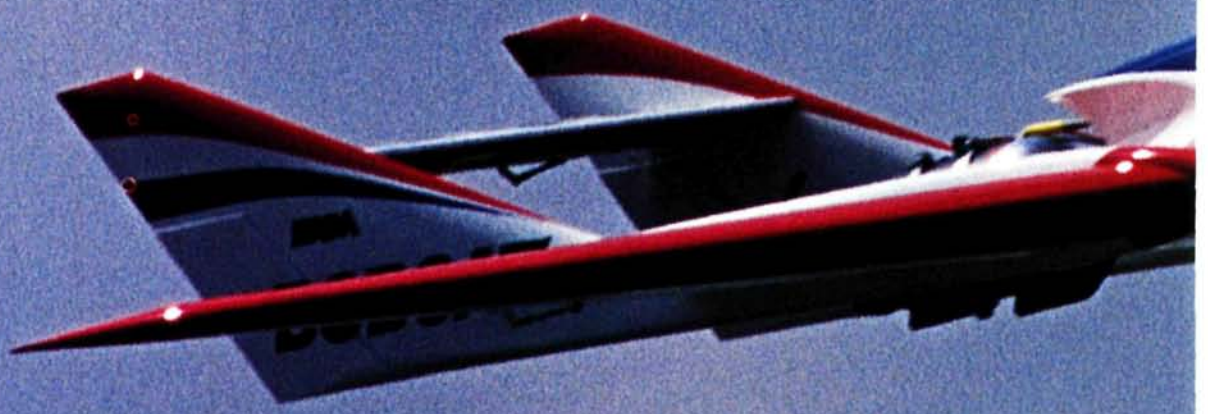
Bob Violett Models

BobCat XL



by Frank Tiano

You know, there are times when I'd rather refer to an article on a particular product as a "report" than as a "review." One thing's for sure: a review should not be just a reprint of the product's instruction manual; I think we have all seen that too many times. With that in mind, I'd like to tell you about my experiences with the Bob Violett Models (BVM) BobCat XL—a totally different type of model airplane kit. I use the word "experiences," plural, because I have been instrumental in building two of them at the time of this writing!

The BobCat XL is truly a state-of-the-art model jet that incorporates the latest in material selection and construction procedures. It has many composite parts but features a built-up wing and stabilizer. When a modeler who has never built a wing comprised of ribs, spars, gussets and sheeting finishes these flying surfaces, there is no kit that he won't be able to tackle. And that is part of BVM's concept with this kit: for the modeler to learn, be successful and be proud of his accomplishment.

WHAT'S IN THE BOX?

The parts for each procedure are in separate, sealed and labeled plastic bags, so when you are building the stabilizer, you don't have to worry about losing some wing or fuselage parts in the process; you simply locate the stabilizer bag and work from it. All of the wooden parts are separately bagged as well, and the first thing you'll notice is that almost all the parts—excluding wing leading edges and spars—have been expertly laser cut. The hardware bags are probably the most complete that I have seen to date. All that you need to complete this kit is the BobCat's landing-gear system and an engine, fuel tanks, radio and an assortment of adhesives and tools. Lying flat on the very bottom of the box is a set of incredibly clear plans and a 55-page instruction manual. Of course, all manuals are important, but this one is unique in explaining techniques, tools, adhesives and procedures. For example, one page lists all of the abbreviations used throughout the manual and even suggests a specific particle

SPECIFICATIONS

MODEL: BobCat XL

MANUFACTURER: Bob Violett Models

TYPE: sport jet

WINGSPAN: 66 in.

WING AREA: 1,000 sq. in.

LENGTH: 79 in.

WEIGHT: 19 to 20 lb. (19 lb. as built)

ENGINE REQ'D: 15- to 17-lb.-thrust turbine

ENGINE USED: RAM 750

RADIO REQ'D: 7-channel computer radio

LIST PRICE: $1,275 (kit), $795 (landing gear), $68.50 (optional clear canopy and cockpit deck)

FEATURES: composite, fiberglass and laser-cut wood construction; 55-page instruction manual and plan. All hardware necessary to build model is included.

COMMENTS: I believe that the BobCat XL is the ideal airframe for anyone interested in becoming a turbine jet pilot. There is no question of success. Factory personnel are willing to take questions (but you won't have any!).

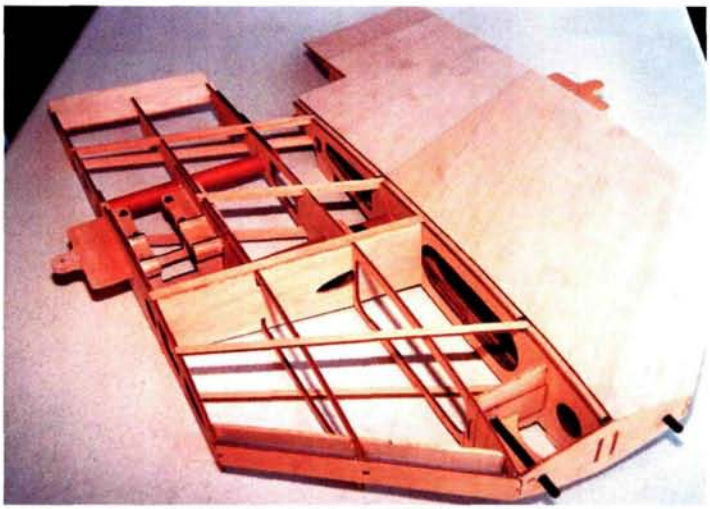
HITS

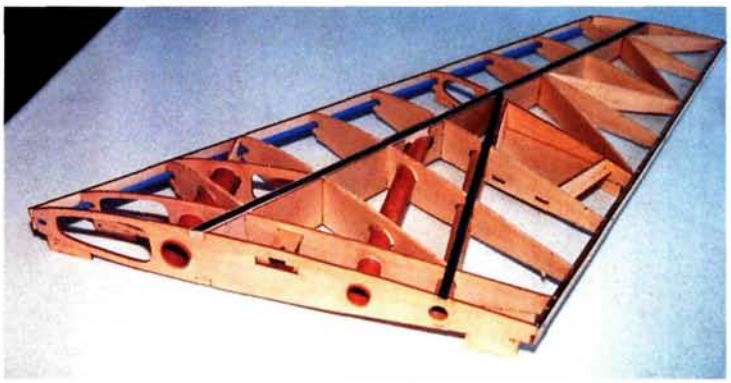
- Extremely high-quality parts and components.
- Excellent construction manual.
- Good looks.
- Great flying machine.

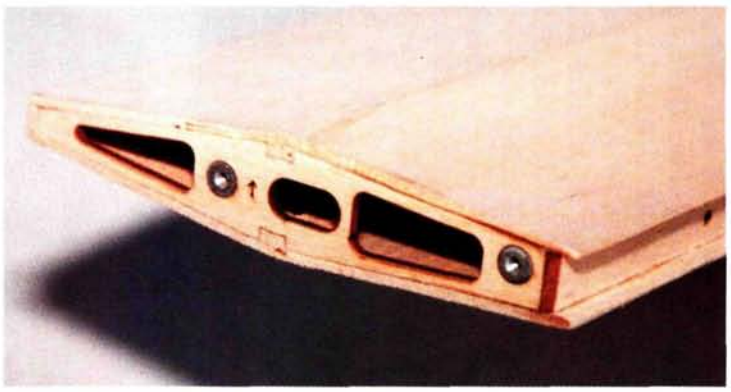
MISSES

- No full-color label on the box; maybe fewer are stolen that way?

Ultimate turbine trainer!







Above: the BobCat's wing is made of beautifully laser-cut parts. Here, half of the wing's center section has been sheeted. Top right: the outer wing panels are also made with laser-cut parts and are strengthened with the liberal use of carbon fiber, as shown here. Right: the horizontal stabilizer is also made with laser-cut wooden parts. Note the precisely cut lightening holes in the end rib.

mask to use while sanding. It tells you exactly why, when and where to use specific adhesives, how to prepare fiberglass parts for glue, and where to apply a barrier so that the internal structure is protected from jet fuel and other solvents. The manual calls specifically for Zap CA, Zap-A-Gap, Sheet Zap, Flex Zap and Slow Zap. It also recommends the use of BVM's own Aero Poxy, which is one of the strongest two-part adhesives on the planet. It also features photographs of tools that will undoubtedly make your building life a whole lot easier and more enjoyable. Many, many diagrams and photographs help the modeler through most construction sequences.

WING AND STABILIZER CONSTRUCTION

Ninety-six photos and half a dozen diagrams in the manual are dedicated to the wing construction section. The BobCat wing is constructed upside-down over the plan and in three sections. Eventually, the center section will be permanently fastened to the fuselage, and the two outboard sections will be joined to the center section with a set of common wing tubes and a bolt on each side. The manual suggests that you buy a 24-inch steel ruler and a 24x48-inch Armstrong no. 1450 ceiling tile to use as a building board and to help keep the wing structure absolutely true. The manual also suggests that a modeler with any built-up-construction experience should expect to invest 15 hours or so in building the wings and stab.

The spars and ribs are laid over the plan, and the rib tabs are temporarily glued directly to the building board, through specific slots cut out of the plan at indicated areas. This keeps the wing structure immobile during construction. The wing has a specific area to harbor the fuel tanks, so it is a good idea to have the tanks ready during the wing-building process. That's right; the fuel tanks are in the wings, just like many real jets'! There is little chance of your having to remove the tanks, but just to cover the unforeseeable, BVM provides cool hatches in the bottom wing skin to allow you to easily service or replace the tanks. And speaking of wing skins, not only are they prejoined, but they are also printed with lines and diagrams indicating where they should be glued and what gets cut away later on. For example, the servo hatches are clearly defined on the wing skin in black ink so that when you cut them away, you're looking directly at the servo opening. The landing-gear blocks are a perfect fit and require a ribbon of Aero Poxy around their joints to ensure that they remain rigid during any rough landings. By the way, the BobCat uses its very own landing gear.

There are 16 photos of stabilizer construction, three more showing hinging and another three showing servo installation. Along with the elevator, the stab is built right on its skin, which is marked with the locations of the ribs and spars. The stab has very few parts, so it is quite easy to build and takes less than 2 hours. The elevator hinging and servo installation takes another hour or so. The construction features ribs and spars, which are then covered by sheeting. Sheeting the wing is easy with Sheet Zap; it does not run, and it takes a long time to cure, so you have plenty of time to position the wing sheeting to the spars and ribs. Both the wings and the stab are finished with lightweight fiberglass cloth and polyester or epoxy resin. Depending on your final color scheme, you may want to use Zap Z-poxy finishing resin or Sig's polyester resin. Z-poxy doesn't smell the way polyester resin does, but it shrinks for quite a while, so dark colors may need another light coat of resin so that the weave or hatch marks in the cloth don't show through after many hours in the sunlight (this isn't a problem with lighter colors).

The stab mounting tube and hardware are very interesting and well thought out. The BobCat may be disassembled for transportation or shipping. The stab comes apart from the two booms, the outer wing panels slide away from their respective tubes, and the booms slide off as well.

LANDING GEAR

The BobCat's landing gear is air-operated. All three gear retract toward the rear of the aircraft. The nose gear has just one simple door. The same goes for the main gear, except that the main doors have holes in them so they act as a speed brake to help slow the Cat down for landing. I found that with a small air tank and at 100 pounds of pressure, I could get four—and sometimes five—complete retraction sequences. For durability and economy,

FLIGHT PERFORMANCE

TAKEOFF AND LANDING

After lining up on the centerline of the runway, I activated the brakes and ran the engine up to about ⅓ throttle. I returned to idle, released the brakes, slowly advanced the throttle, and the BobCat starting rolling. Once it was tracking straight, I advanced to full throttle and it was like this thing got kicked in the butt with a jackhammer! Within 50 or so more feet, with a little backpressure on the stick, the Cat became airborne. I hit the gear switch, and the gear—restricted with Robart air line restricters—came up slowly and with authority. The model tracked out pretty darn true, and I throttled back to ½ to complete a couple of racetrack-pattern passes. Subsequent takeoffs have shown very little rudder input to be necessary unless there is a crosswind. I have the nose-gear steering on low rate so that any input or correction does not produce an abrupt reaction during takeoff.

Landings with a turbine-powered model are a little different from those with a typical sport ship or large aerobatic airplane. Because the airframe is so clean and there is no prop to create drag, turbine aircraft take a while to slow down. For the first landing, I came off the throttle just as I entered the downwind leg. By the time I turned final, I needed just a tiny bit of throttle to keep the airplane coming toward me. The main-gear doors do act as a speed brake, and by the time I turned final, they were doing their job; that's why I needed the little spurt of throttle. Once the BobCat was about 3 feet off the ground and it had settled slowly, I cut the power completely, and it settled in for a perfect landing. In a nutshell, takeoffs and landings are easy to execute and make the pilot appear to have far more experience that he really might have.

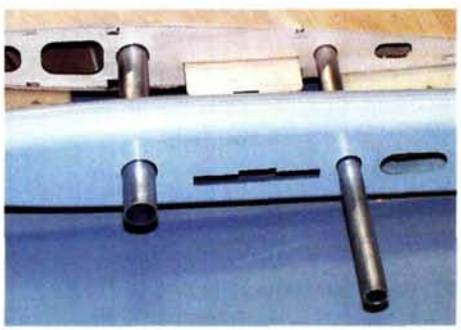
HIGH- AND LOW-SPEED PERFORMANCE

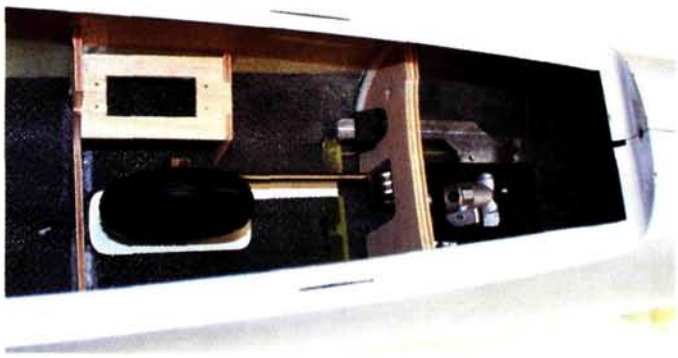
This is a jet, so there isn't much need to talk about high-speed performance. There is no logical reason to fly this bird at the edge of its envelope. Flying a turbine-powered model with the throttle set in the full wide-open position is not fun; in fact, it's dumb! The aircraft can get away from even the most experienced modeler in a heartbeat. At 200mph, the aircraft is traveling 17,600 feet per minute, and that translates to 293.3 feet per second. In other words, in 4 seconds, you're almost ¼ mile away! And that, my friend, is too scary for anyone except a truly experienced jet pilot with excellent coordination and exceptional eyesight. For the record, however, the BobCat will hit 200mph if you need it to, and it will do anything you like at that speed.

Slow flying is where the BobCat really excels. At speeds in the 40 to 120mph range, it is a true sport jet. It remains stable right down to a walk and can accelerate quickly. It has a very gentle stall and recovers quickly as soon as you push the nose down and pick up a little speed. It gets a little mushy just before the stall, so it isn't a surprise. In a brisk breeze, you can maintain complete control while keeping the BobCat nearly in a hovering attitude. If you can get to a jet fly-in and see one of these birds perform, you will see exactly what I'm talking about. I haven't yet seen another sport jet on the market that has quite the slow speed characteristics of this airplane.

AEROBATICS

I'll make a bold statement here. I don't know of any maneuver that's regularly performed by a jet that this aircraft cannot do. In the hands of a reasonably good pilot, the BobCat is easily capable of point rolls, smooth inverted flight, huge loops, Cuban-8s and even some snapping maneuvers (with a little practice). Best of all, it can do all of these maneuvers at ½ throttle—or less!





Above: these are the metal carry-through tubes that align the tail booms and outer wing panels with the wing center section. The booms are molded-composite structures. Right: this is the retractable nosewheel assembly. The installation is straightforward and simple.

BVM offers a heavy-duty set of wire landing-gear struts for the BobCat. I found these wire struts to be forgiving and durable, especially when flying from grass fields. BVM offers a great braking system that includes the wheels, tires and brakes as well as a unique brake valve and operating system. After more than 14 flights, I have had no problems with it.

ENGINE AND RADIO INSTALLATION

I am putting these two parts of assembly in the same category because in a turbine-powered model, they really do go together. Mounting the actual turbine engine in a BobCat XL takes only a few minutes. It's the other stuff—the electronic control unit (ECU), fuel pump, battery, fittings, valves and plumbing—that takes time. The BobCat fuselage houses all turbine-related accessories as well as the flight-pack battery, receiver, gyro and air tanks for the retract and brake systems. There is also an ultimate air trap (UAT); this is a necessary part of the fuel system that prevents any dirt or air bubbles from getting anywhere near that turbine! Needless to say, it gets quite crowded in the fuselage, and that is why you need to plan the engine and radio installation at the same time.

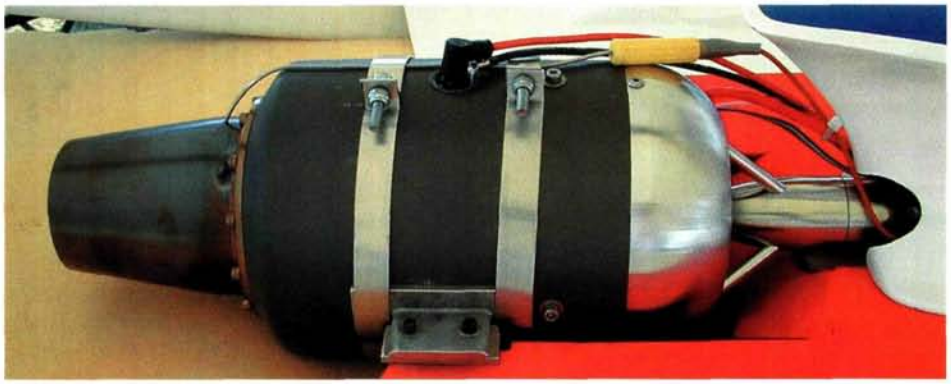
The BobCat XL performs well with a turbine that produces between 11 and 20

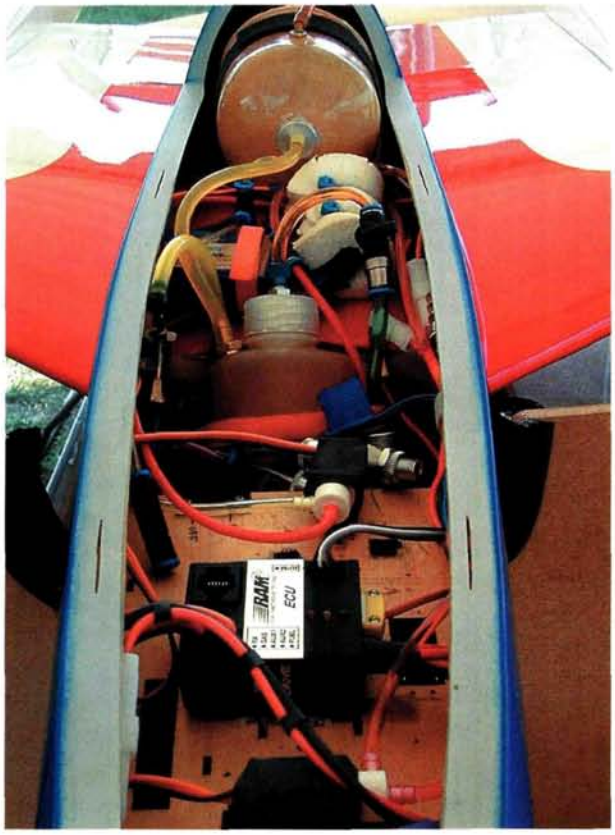
pounds of thrust. The airframe seems ideally suited to a turbine that produces about 17 pounds of thrust, and the SimJet 1700, R.A. Microjet RAM 750, AMT Mercury and JetCat 120 are good choices. I had been happily using a RAM engine in my MiG but found that I couldn't obtain another because they were in such demand just when I needed one for the BobCat. So after seeing SimJet's product perform, I opted for its new 1700 engine. I agreed to be a sort of guinea pig for SimJet and to try various modifications to help with the development of the engine's automatic start unit, but after a couple of flights, the SimJet failed to start on command. During this time, SimJet was in the process of changing its U.S. distributor and repair station, so I had no one to turn to for help. I decided to remove the SimJet and replace it with something else. Fortunately, RAM was just coming out of its back-order situation. The RAM 750 took me just about 2 hours to install. A nice feature of the RAM is that it has a little box that tells you anything and everything you need to know about its operation, from startup to cooldown. I enjoy looking at a display that gives me a real-time readout of what is going on with the engine.

The BobCat functions on only 7 channels: ailerons, throttle, rudder, elevator, gyro, retracts and brakes. There are no flaps. Not any old 7-channel radio will do, however; to make endpoint adjustments and servo travel (or "throw") completely selectable by the pilot, a simple computer radio is suggested. I chose my trusty Airtronics Stylus radio. Even though it has one more channel than I need, I really like this radio for use in a jet model aircraft. The Stylus allows me to assign any switch on the transmitter to any function I like. For example, I prefer to have my dual-rate switches on the upper left, and I also prefer to have dual rates on ailerons and elevator operational at the same time. The Stylus allows me to do this. It also allows me to use one of the extra channels as an additional aileron channel. In other words, I have the left and right aileron on separate channels so that I can independently adjust either one. It could also be considered a safety factor in case you lost one aileron, although in all my years of flying, I have hardly ever seen that happen!

Airtronics makes the neatest, coolest little servos (item no. 94121Z) that are ideal for jet models that need small, flat units with strong gear trains. The 1.4x0.85x1.3-inch 141Z servo has ball bearings with a metal gear train and coreless motor and features dual mounting tabs so it can be installed on its side as well as upright. I used these servos in the BobCat's elevator and rudder positions without any problems.

The BobCat's fuselage is large enough to house a gargantuan battery pack for the airborne system. I use an Airtronics 2000mAh pack and get plenty of flight time with it. Come to think of it, I can get more than one worry-free flight from the airborne pack, but the battery for the turbine must be recharged after every flight (that onboard starter draws a lot of juice during the automatic start procedure!).





Above: the turbine engine is out in the open for easy accessibility and simple installation. Left: with the main fuselage hatch removed, you have unlimited access to all the internal components. Maintenance and the installation of all the hardware, electronics and fuel system could not be easier.

CONCLUSION

This is one fine model airplane. The BVM BobCat XL is a lot of kit for the money, and I believe it will go a long way toward teaching building skills to those entering the jet set with nothing but ARF experience under their belts. The quality of the parts is exceptional, the thoroughness of the instruction manual is extreme, and the parts fit in all cases was nothing but perfection. The BobCat's flight envelope allows extremely slow flight or brisk jaunts at close to 200mph. This is one model that is ideal for entry-level flying as well as advanced jet piloting.

Some may think this review has been sugar-coated; I assure you that it has not. When a hobbyist is fortunate to get a kit that is just about perfect in every way, it is not a crime to say so. Is there anything at all I did not like about the BVM BobCat? Actually, yes; there are two things, and I told them to Bob Violett himself. One: my kit did not have a clear canopy. Solution: an optional clear canopy is now available, and I've already fitted it to my model. Two: I told him that I think it should have guns, rockets and bombs. Solution: he told me to go design my own jet!

Airtronics *(714) 978-1895; airtronics.net.*
AMT; *amtjets.com.*
BVM *(407) 327-6333; bvmjets.com.*
JetCat; *distributed by Golden West Models (818) 781-7364; goldenwestmodels.net.*
R.A. Microjet *(305) 863-1970; ramicrojets.com.*
Robart *(630) 584-7616; robart.com.*
Sig Mfg. *(641) 623-5154; sigmfg.com.*
SimJet; *simjet.com.*
Zap Adhesives *(800) 538-3091; pacertech.com.*

A nostalgic parasol performer

by Bob Van Tassel

Looking somewhat like a 1929 Pietenpol Air Camper, the Great Planes Pete 'N Poke Sport 40 kit makes a great Sunday flyer. As does its predecessor, the popular Slow Poke, the Pete has a flat-bottom wing for excellent slow-speed performance. I had a ball building and flying my Slow Poke, so I knew the Pete would be a winner before I ever opened the box.

Great Planes Pete 'N SP

THE KIT

Included in the kit is a 43-page construction manual that is full of instructions, photos and illustrations; it also contains a metric conversion table and a checklist of materials, supplies and tools needed to complete the kit. I really like the "Tips from the Experts," as they make building the kit easier. It's obvious that Great Planes wants you to enjoy building this plane. The materials are top quality, especially the wood; the die cuts are crisp and sharp. You'll need to add a 10-ounce fuel tank, 3-inch-diameter main wheels and a 1-inch tailwheel to complete the kit.

ke
ORT 40

PHOTOS BY WALTER SIDAS & BOB VAN TASSEL

SPECIFICATIONS

MODEL: Pete 'N Poke Sport 40

TYPE: sport

MANUFACTURER: Great Planes

WINGSPAN: 59½ in.

LENGTH: 47 in.

WEIGHT: 5 lb., 12 oz.

WING AREA: 809 sq. in.

WING LOADING: 16.4 oz./sq. ft.

ENGINE REQ'D: .40 to .46 2-stroke or .40 to .52 4-stroke

ENGINE USED: O.S. .52 4-stroke

RADIO REQ'D: 4-channel with 5 servos (2 ailerons, elevator, rudder, throttle)

RADIO USED: Futaba T6XA

PROP USED: Master Airscrew 11x5

FUEL USED: Omega 15%

PRICE: $74.99

FEATURES: CAD-engineered plans; simple interlocking construction; detailed photo-illustrated construction manual; large wing area and light wing loading.

COMMENTS: the Pete 'N Poke looks like a loose interpretation of the Pietenpol Air Camper; with its large wing area and slow, stable flying characteristics, it is reminiscent of homebuilt planes of 1929. The kit is well engineered, and the plan is well drawn and easy to interpret.

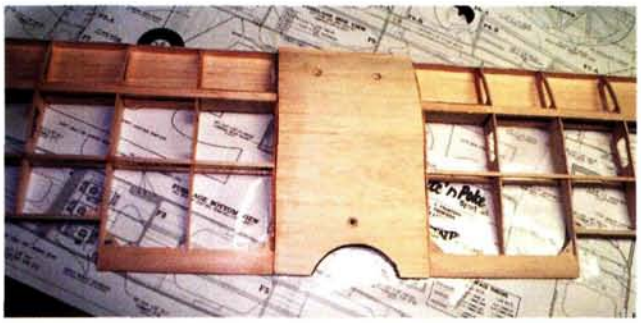
HITS
- Fast assembly.
- Excellent materials and die-cutting.
- Good slow-flying flight performance.
- Detailed building manual.

MISSES
- None.

CONSTRUCTION

I started by identifying the parts. For most of the building, I used Great Planes thin, medium and thick CA along with 5- and 30-minute epoxies. For easy sanding of the sheeted areas, I used aliphatic wood glue.

• **Tail feathers.** The elevators and stabilizer are built using a combination of laminated die-cut parts and balsa sticks. When the assemblies were completed, I sanded them flat and then rounded the leading edges. I marked the hinge locations and cut the slots using my Great Planes Slot Machine (it's a great labor saver that accurately cuts hinge slots). The two elevator halves are connected with a joiner wire, which I fitted but didn't glue into place until final assembly. The rudder and fin are built and finished in the same manner.



Left: the wing is built in three sections and then joined. The center section must be built accurately to ensure proper alignment of the outer panels. Note that the center section is sheeted with 1/16-inch balsa for strength. Below: the wing panels are typical D-tube construction, and they build quickly and easily. I used CA for most construction.

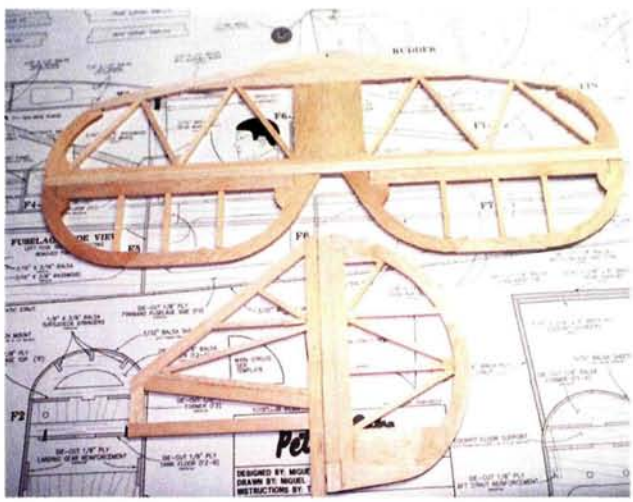
• **Wing.** The wing is built over the plan in three sections. I started with the center section; it is constructed on top of 1/16-inch balsa sheet. Be certain to build it accurately, as it sets the wing alignment and dihedral. I glued the ribs and spars onto the sheeting and then added the dihedral braces followed by the trailing edge. When all interior construction was completed, I sheeted the top of the center section with 1/16-inch balsa. I carefully drilled the mounting holes for the wing and cut a semi-circular hole over the cockpit area to provide visibility for my pilot figure. Be sure to center the cutout; it's incorrectly shown on the plan as being off-center.

Building the outer panels is straightforward and held no surprises; they went together quickly. After placing the ribs and spars, I added the leading edge and the top and bottom sheeting; the panels are sheeted from the leading edge to the spar, and then I built the ailerons on the plan with the wing panels still in place. I now added the two aileron servo trays and the strut support pockets in each wing. I sanded the wing and set it aside until later.

• **Fuselage.** The first step is to construct the two fuselage sides using the die-cut balsa and plywood and to glue the fuselage parts together. Be sure to follow the instructions carefully when you attach the engine doublers; they set the required right thrust. Now glue the fuselage formers into place and check their alignment as you go. Then build and add the strut-reinforcement blocks that hold the parasol wing. I took particular care in this step, as I knew that this would later affect the wing's alignment.

I added the tank floor, stab base and landing-gear block and then coated the inside of the engine compartment and forward fuselage bays with alcohol-thinned epoxy. As directed, I added the fin and stabilizer to the fuselage, and I glued in the cockpit floor and the rear formers and then added the rear stringers.

The parasol wing is held in place with front and rear cabane struts, each consisting of three hardwood pieces. The proper placement and alignment of these struts is crucial, so I used 30-minute epoxy and checked the assembly with a



The tail feathers are built from die-cut parts and balsa sticks and go together quickly. After I sanded them flat, I rounded the edges and used a Great Planes Slot Machine to cut the hinge slots.

FLIGHT PERFORMANCE

For smooth, coordinated turns, I used my computer radio and coupled the ailerons and rudder. I found that this combination worked very well.

TAKEOFF AND LANDING

Takeoffs are easy; the long tail moment helps. As you would do with any tail-dragger, slowly advance the throttle and hold a small amount of right rudder to keep the plane on track; the tail will lift after about 25 feet. As the speed builds, add a little up-elevator, and 75 feet later, the Pete 'N Poke will be airborne.

Landings are just as easy. On the base leg, I reduce the power to ⅓ throttle to descend and then turn onto final. At 15 feet above the ground and over the threshold of the runway, I cut the throttle to idle and let the model settle in. The plane seems to glide forever in ground effect; I use up a lot of runway before it touches down for a beautiful wheel landing and rollout.

LOW-SPEED PERFORMANCE

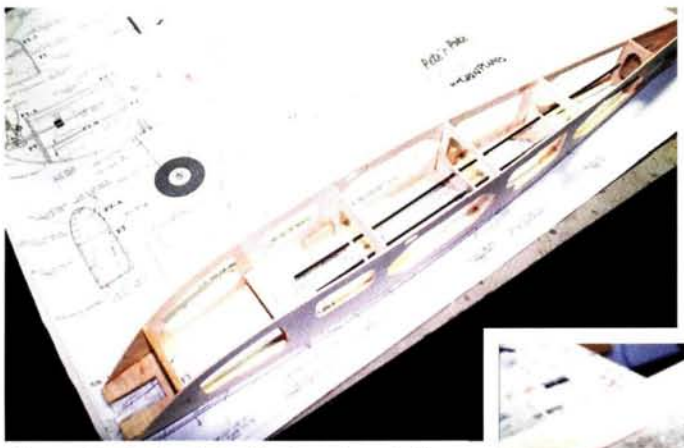
The Pete 'N Poke is designed for slow flight, and it excelled at it. At a safe altitude, I performed some stalls. I brought the speed down to a snail's pace and fed in full up-elevator before I could get anything that faintly resembled a stall. The plane just gently slowed down, lowered its nose to pick up speed and then continued flying.

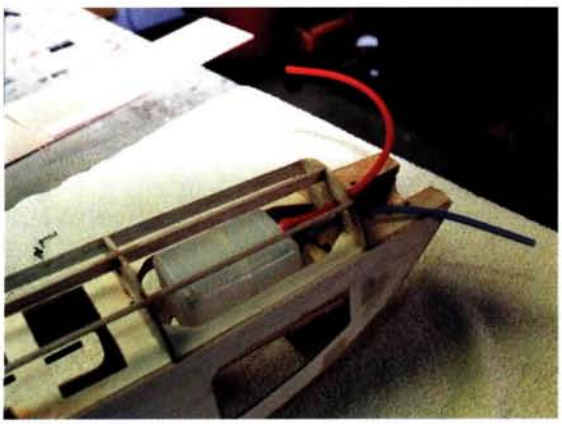
HIGH-SPEED PERFORMANCE

This model is not a fast flyer, but it can cover a respectable amount of sky in a short time. I found that it flies best when it's slightly nose-heavy. What's interesting is the pendulum effect that the parasol wing configuration produces. It took me a while to get used to it, but that's what makes this a fun plane to fly.

AEROBATICS

The Pete 'N Poke easily does basic aerobatics. It will do slow rolls using high-aileron deflection and a little elevator during the inverted part of the roll. You will be surprised by the way it spins; it's a lot of fun! The large elevator makes it loop without using up a lot of sky. This plane has a lot of wing area and is susceptible to wind, so you'll need to compensate during maneuvers on windy days.





Above: after the fuselage sides have been built, they are glued upside-down to the top deck. It's easy to build a straight fuselage with this method. Note the straight rudder and elevator pushrod runs. Right: a 10-ounce fuel tank fits nicely in the tank area and provides plenty of flight time. It needs to be installed before you sheet the top deck.

Great Planes Accu-Point Laser Incidence Meter before the epoxy set. The struts required a number of adjustments, but it was worth the effort to get it right. I next sheeted the forward section of the fuselage, added a Great Planes 10-ounce fuel tank and completed the fuselage.

• **Engine and radio installation.** The engine, radio-equipment and landing-gear installations are a snap; there is plenty of room to work on all of these components. I fabricated the wing struts that are nonfunctional but dress up the plane.

• **Finishing.** After dry-fitting all of the parts, I laterally balanced the plane and then final-sanded it. I used two rolls of maroon and one roll of white MonoKote to cover the plane, and I generated a tail graphic on my computer and printed it on Micro-Mark decal paper with my ink-jet printer. The main wheels are Great Planes 3-inch-diameter treaded wheels, and the tailwheel is 1-inch diameter. To attach the two windshields, I cut a slit in the covering and used medium CA. I dressed up the cockpit by adding a Williams Bros. ⅙-scale pilot that I detailed with acrylic paint and then fuel-proofed with a coat of clear polyurethane.

This is one of the few planes I have built that has come out right on the money as far as the weight is concerned. It required no additional weight to balance on the recommended center of gravity (CG), but I later added 2 ounces in the nose to improve the control response.

CONCLUSION

Great Planes has put a lot of effort into the design and production of this kit, and it shows. I like the concept and thoroughly enjoyed the time I spent building it. The pendulum effect generated by the parasol wing will give the experienced flier a new dimension to explore. ✈

Futaba Corp. of America; *distributed by Great Planes; futaba-rc.com.*

Great Planes Model Distributors Co. *(800) 637-7660; greatplanes.com.*

Master Airscrew; *distributed by Windsor Propeller Co. (916) 631-8385; masterairscrew.com.*

Micro-Mark *(908) 464-2984; micromark.com.*

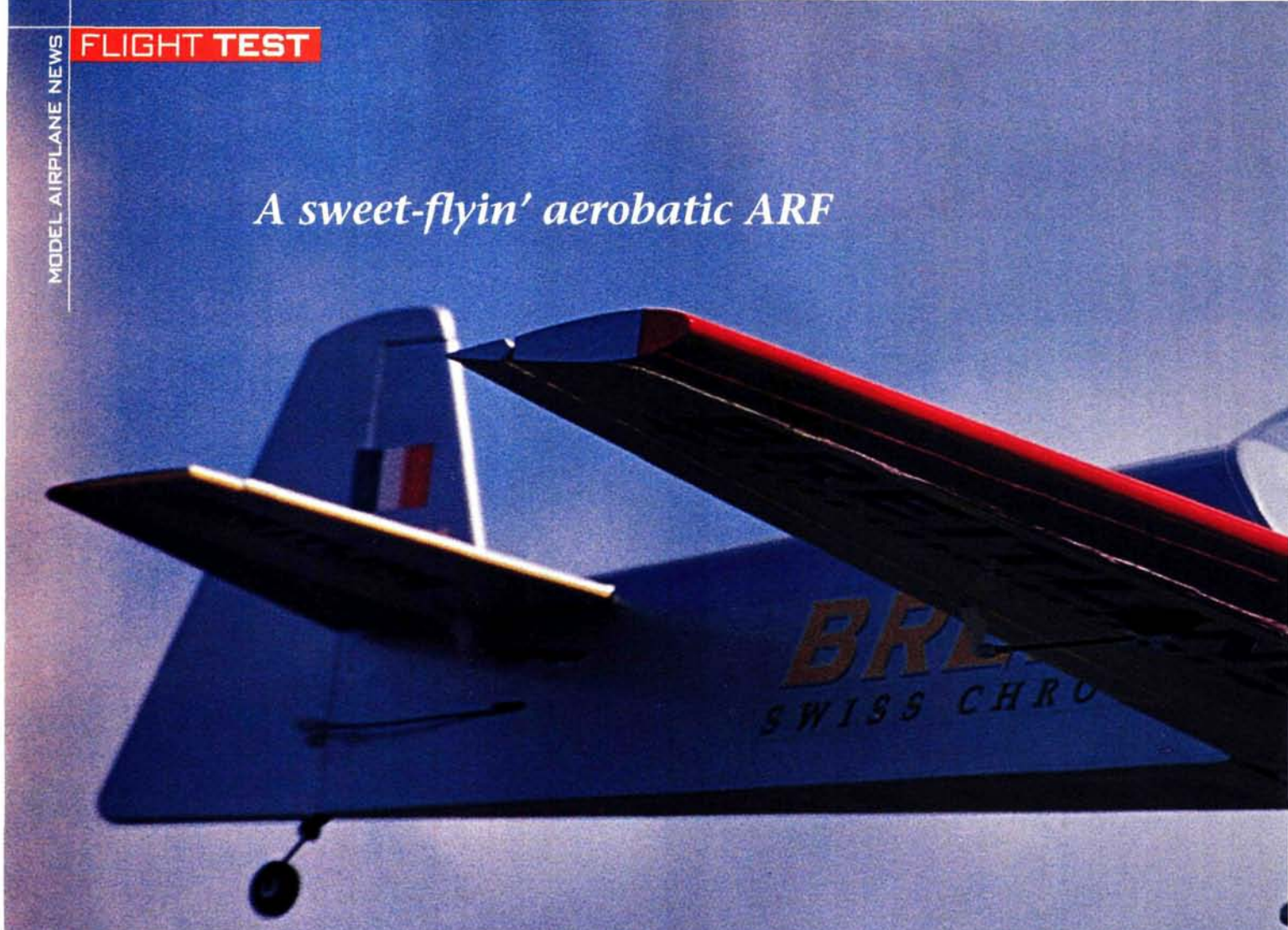
MonoKote; *distributed by Great Planes.*

O.S.; *distributed by Great Planes; osengines.com.*

Omega Fuel; *distributed Morgan Fuel (800) 633-7556; morganfuel.com.*

Williams Bros. *(805) 534-1307; williamsbrosinc.com.*

A sweet-flyin' aerobatic ARF



Hangar 9 Sport CAP 232

by John Kotleba

Over the past few years, the popularity of high-performance, 3D aerobatic RC models has dramatically increased—and so have their size and cost. This has made it difficult for the average Sunday flier to upgrade from a basic sport or pattern model, but Hangar 9 is making it easy to move up with its latest model in the Ultra Series product line: the 60-inch-span, $199 Sport CAP 232, a .40-size almost-ready-to-fly (ARF) model.

KIT CONTENTS

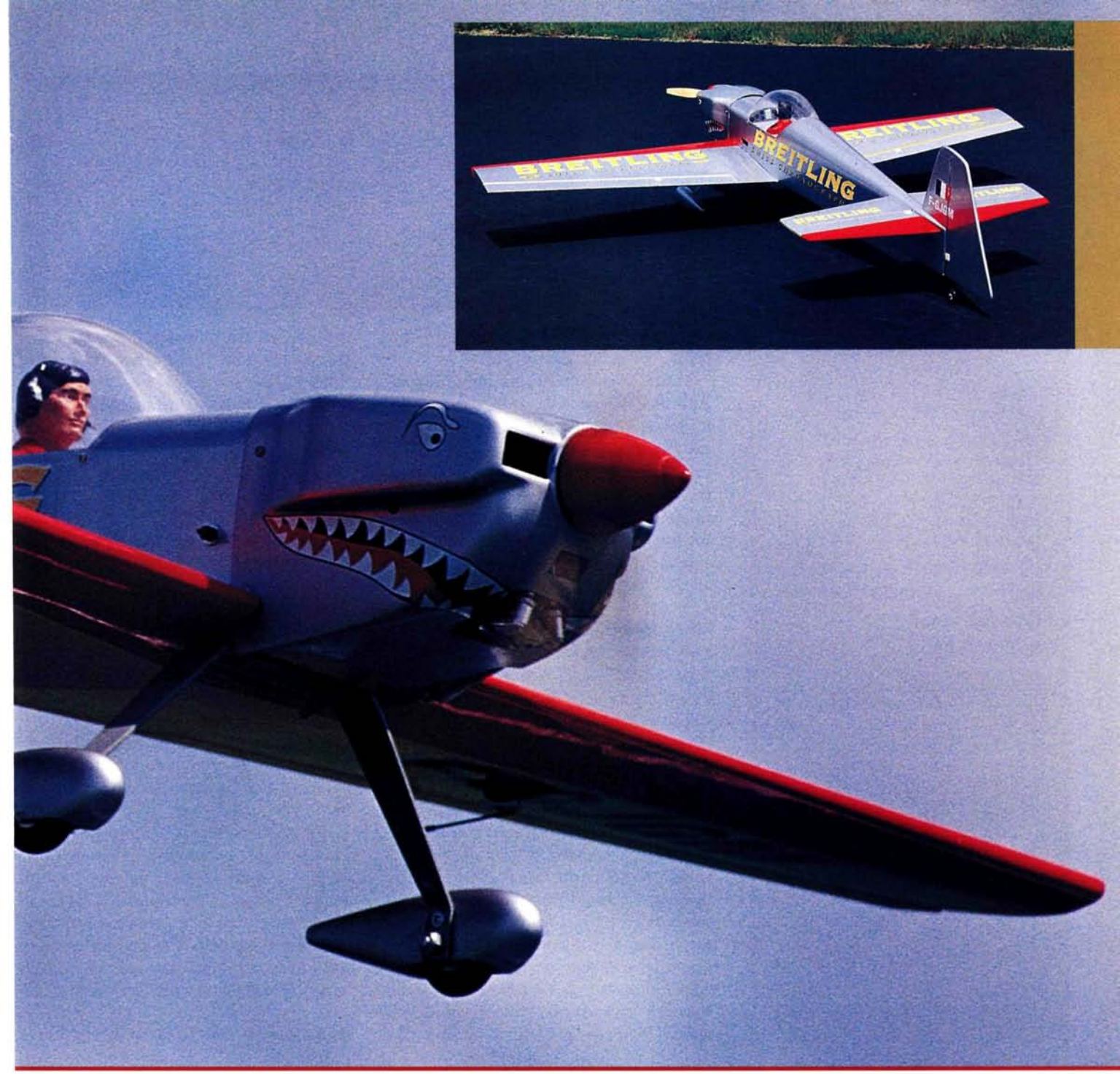
When I opened the box, I discovered that all of the major assemblies are built and covered in UltraCote. All seams were overlapped, and the trim was applied perfectly straight. Only a few wrinkles had appeared in the covering, and these were easily removed by carefully using a heat gun and an iron.

The kit contains all the necessary hardware, linkages, pushrods, a painted fiberglass cowl and wheel pants, main and tailwheels, landing gear, a metal engine mount, a fuel tank, a spinner and a canopy. Also included is a very detailed 44-page, photo-illustrated instruction manual. The only additional items necessary to complete the plane are the radio equipment, some foam padding, the engine, a propeller and fuel tubing.

ASSEMBLY

I assembled the model following the suggested sequences in the instruction manual. I did, however, make a few minor modifications that I'll point out as I go along.

Wing. I attached the ailerons to the wing by applying thin CA to both sides of each hinge. Be sure to maintain a gap of 1/32



inch or less between the wing panel and aileron. When it comes time to glue the dihedral brace and join the wing halves, the manual instructs you to mix approximately 1 ounce of 30-minute epoxy. It's important to keep in mind that epoxy mixed in this amount will start to cure in about 7 minutes. In other words, don't take your time performing this task!

Each aileron has its own servo, so be sure to trial-fit the servos you plan to use, since the wing's airfoil is low profile. I installed two Airtronics 94102 servos that fit perfectly. To thread the servo-extension wires through each wing panel, I used a flexible nylon pushrod instead of the string-and-weight technique shown in the manual. I sealed the bottom side of the aileron hinge gaps with some clear film left over from a previous project.

Knowing that the plane would receive a lot of stress during aerobatic maneuvers, I decided to strengthen the control-horn bases. I removed the film from beneath them, pricked the exposed balsa with a T-pin several times and then soaked the area with thin CA. I wasn't comfortable drilling a ¼-inch hole through the wing's center root ribs to mount it on the fuselage. Instead, I drilled two holes through the wing and the wing hold-down plate, ⅝ inch from the trailing edge and 1 inch from the wing's centerline; then I used 2-hour epoxy to secure the plate to the wing. When I mounted the wing on the fuselage, I drilled and tapped the holes in the wing hold-down block to allow the use of standard ¼-20 nylon wing bolts.

Tail assembly. The tail assembly is straightforward; you need only ensure that the tail feathers are aligned with each other. I needed to sand the left side of the horizontal stabilizer saddle to obtain perfect alignment. Glue the horizontal stab

SPECIFICATIONS

NAME: Sport CAP 232 .40 ARF

MANUFACTURER: Hangar 9

DISTRIBUTOR: Horizon Hobby Inc.

TYPE: sport-scale aerobat

WINGSPAN: 60 in.

LENGTH: 56 in.

WING AREA: 594 sq. in.

WEIGHT: 6 lb., 4 oz.

WING LOADING: 24.3 oz./sq. ft.

RADIO REQ'D: 4-channel w/5 servos (aileron [2], elevator, rudder, throttle)

RADIO USED: Airtronics Radiant 6-channel w/3 Hitec HS-605BB servos (elevator, rudder, and throttle); 2 Airtronics 94102 servos for ailerons

ENGINE REQ'D: .40 to .58 2-stroke or .56 to .72 4-stroke

ENGINE USED: Saito FA-72 4-stroke

PROP USED: Zinger 13x6

FUEL USED: Wildcat 15% nitro

PRICE: $199.99

FEATURES: balsa and ply construction; covered in UltraCote; fiberglass painted cowl and wheel pants; photo-illustrated manual; complete hardware package.

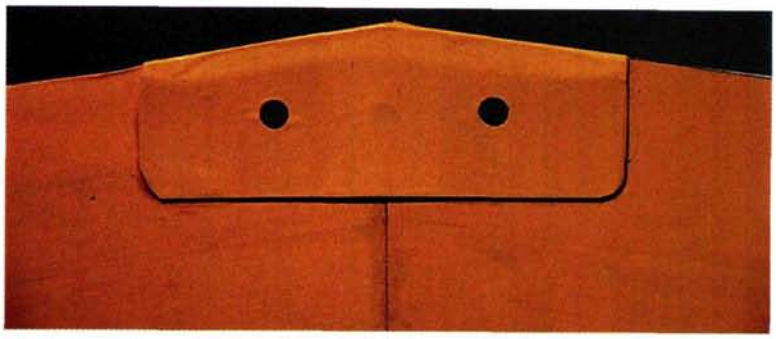
COMMENTS: the Sport CAP 232 can be assembled quickly and can easily be flown by any intermediate pilot. For best performance use a .60-size 2-stroke or a .72-size 4-stroke with a 13x6 propeller.

HITS

- Great flight performance.
- Excellent covering.
- Very good manual.
- Ease of assembly.

MISSES

- Landing-gear orientation isn't clear.



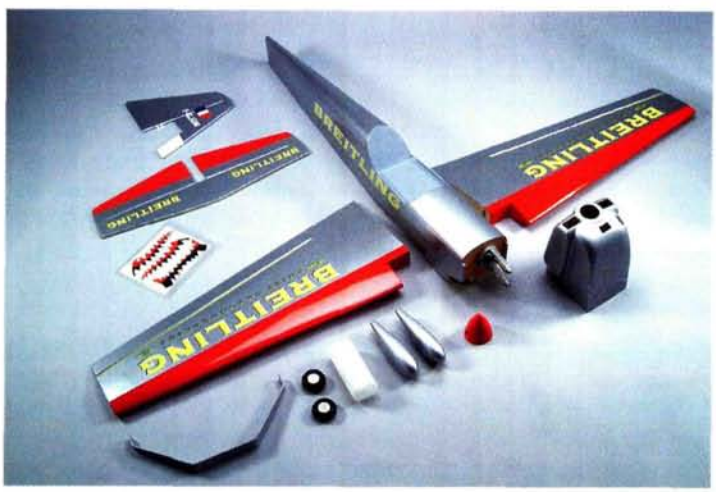
I was uncomfortable drilling a large hole through the wing's root ribs, so I changed the wing hold-down from a single screw to dual screws.

into place and allow the epoxy to cure before you add the vertical fin.

When I removed the covering from the vertical stabilizer slot, I saw that I needed to remove a small piece of wood to allow the slot to extend to the rear of the fuselage. I also had to sand a bit of wood from the front edge of the vertical fin so the hinge line would be flush with the rear of the fuselage. When I was satisfied with the alignment, I glued the fin into place and allowed the epoxy to cure overnight.

Main landing gear. The landing-gear struts are slightly tapered, and the instruction manual does not identify which direction the taper should face. I noticed this after I had mounted the wheels and wheel pants.

Before you assemble and mount the wheel pants, you need to identify the right and left wheel pants for each strut. The instruction manual tells you to measure 5/8 inch from the bottom of the pants to locate the hole for the main axle. Instead, I located the hole 3/8 inch from the bottom edge so I would have a little more clearance. If you intend to fly from a grass field, it may be wise to leave the wheel pants off. A 4-40 blind nut passes through a small piece of plywood and secures the pants to each gear strut with a short bolt.



The Sport CAP 232 is a very complete kit. All of the major components are built and covered in UltraCote, with the graphics applied at the factory.

Engine installation. I wanted to install the largest 4-stroke engine recommended, so I used a Saito FA-72. I like the sound of a 4-stroke and felt this engine would give me the best power-to-weight ratio. The firewall comes already drilled for a side-mounted engine, but I wanted to mount the engine inverted to avoid unsightly holes in the side of the cowl. I relocated the centerlines for the built-in thrust angles and drilled new holes. I installed the engine mount with the supplied hardware and coated the back side of the firewall with 30-minute epoxy. I also used a 90-degree header that allowed the muffler to exit through the bottom of the cowl. To accommodate the inverted engine, I rotated the throttle arm on the carburetor 180 degrees and then installed the throttle pushrod, making sure it would not interfere with the fuel tank. I mounted a remote glow-plug igniter on the right side of the fuselage to make it more convenient to start the engine.

Fuel tank. When I assembled the fuel tank, I added a third line to use as a fill line and then pressure-tested the tank in the kitchen sink. There was a leak in the rubber stopper where the 3mm screw passes through it, so I exchanged the rubber stopper for a spare. I then wrapped foam around the rear of the tank and installed it as directed in the instruction manual. The hole in the center of the firewall was too small to accommodate the neck of the fuel tank, so I enlarged it with my Dremel tool.

Radio installation. To be on the safe side, I used Hitec HS-605BB high-torque servos because of the large surface area of the rudder and elevators. I had to add two plywood strips to prevent the servos from bottoming out when I installed them in the servo tray. I ran a nylon tube from the radio compartment to the rear of the fuselage for the receiver antenna.

When I assembled the pushrods, I inserted two 36-inch-long brass tubes through the elevator pushrod exits to where the servos are mounted; this helps guide the split elevator pushrod through the exit slots. The pushrods needed to be cut to the proper length before I attached the supplied hardware.

Fitting the cowl. Because I mounted the engine upside-down, only the valve covers

FLIGHT PERFORMANCE

TAKEOFF AND LANDING

With just a little rudder input, the plane tracks straight down the asphalt runway. As the plane accelerates and the appropriate airspeed is attained, it gently lifts off the runway without any elevator input.

Landing approaches are clean and very long with power being reduced to less than ¼ throttle throughout the entire descent. This results in a low sink rate with a long, stable glide path, and I throttle the engine back to idle once the plane passes the final turn on approach. Main-wheel and 3-point landings are easy to do; the plane rolls out straight down the asphalt for about 100 feet once it touches down.

LOW-SPEED PERFORMANCE

The Sport CAP 232 is very stable and responsive at low speeds. I induced stalls several times at a three-mistakes-high altitude. Each time, the plane stalled straight ahead as it dropped its nose. I noted no snapping tendencies.

HIGH-SPEED PERFORMANCE

The Saito FA-72 supplies ample power for high-speed flight. The plane is stable and tracks well. The controls are responsive without being overly sensitive.

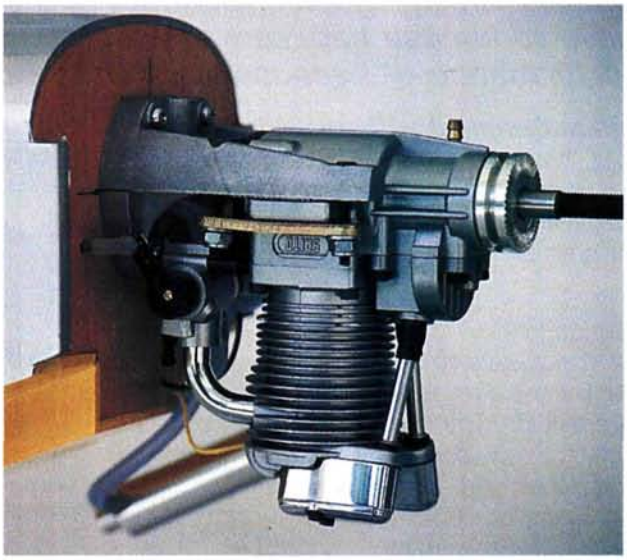
AEROBATICS

The CG seemed to be good for most aerobatic maneuvers when it was set at the recommended 4¾ inches from the leading edge. When set on low rates, axial rolls are moderate, and fairly large loops (inside and out) are round and easily performed. When inverted, elevator input is not required to maintain level flight. A bit of up-elevator is needed to maintain a straight flight path while performing knife-edges. At high rates, axial rolls are fast, and snap rolls are crisp and on command. The Saito with the 13x6 prop improves hovering maneuvers, and torque rolls can be accomplished if a larger engine is used.

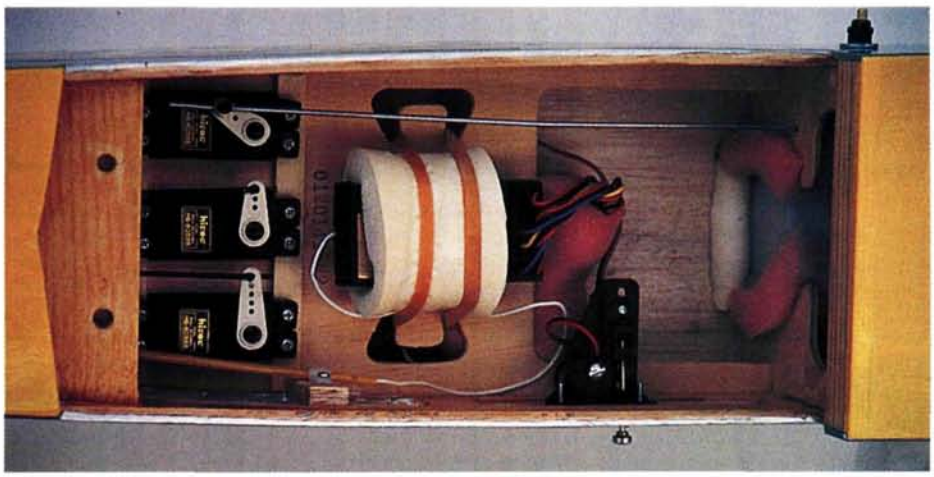
and a portion of the muffler stick out of the bottom of the cowl. I drilled a small hole on each side of the cowl for access to the carburetor needles. I used the included hardware to attach the cowl to the fuselage, making sure that the location of the lower mounting screws did not interfere with the wing. The shark's-mouth decal was easy to apply to the flat side surfaces of the cowl, but I had to make several razor slices on the decal's center section to eliminate wrinkles.

FINAL PREPARATIONS

I added a Model Graphics ⅛-scale sport pilot and then trimmed the canopy and screwed it into place. The model balanced without adding any weight, and I adjusted the travel for each control surface using the values listed in the manual. Since my transmitter only allows dual rate for the elevator and ailerons, I set the rudder to 2¼ inches of travel.



I mounted the Saito FA-72 inverted, and this made for a neater installation. I had to drill new holes for the engine mount, making sure I centered the engine on the thrust line.



The radio compartment is well organized and easy to work in. Note the plywood strips under the servos; they were necessary to raise the servos to prevent them from hitting the top deck of the fuselage.

CONCLUSION

This is a great-looking, quick-building ARF with great flying characteristics. Any intermediate or advanced flier who has flown a tail-dragger can handle this aircraft. The Sport CAP 232 is a great way to ease into the world of precision and 3D aerobatic flying without straining your bank account. I highly recommend this plane to anyone starting out in precision and 3D aerobatics. ✈

Airtronics (408) 977-7800; airtronics.net.
Hangar 9; distributed by Horizon Hobby.

Horizon Hobby (800) 338-4639; horizonhobby.com.

Model Graphics (337) 269-5177; model-graphics.com.

Saito; distributed by Horizon Hobby.

Wildcat Fuels (859) 885-5619; wildcatfuel.com.

Zinger; distributed by J&Z Products (310) 539-2313.

Lite Machines Corona

This little electric chopper is big on fun

by Rick Bell

Glow-powered helicopters from Lite Machines have been around for several years now, and these entry-level helis have proven easy to build and fun to fly. But most of all, they have proven to be very durable. The new Corona has these same attributes, but it offers the convenience of electric power. The basic design hasn't changed, but to accommodate the transition to electric power, the servos and motor have swapped positions, and the throttle servo is not required. The conversion has also made the crutch simpler to construct, and you'll need to use a small piezo gyro, as the Arlton gyro has been eliminated.

PHOTOS BY RICK BELL & WALTER SIDAS

FIRST IMPRESSIONS

When I opened the box, it was clear to me that a lot of thought went into the design and packaging of the helicopter; all the parts are labeled and have been bagged by subassemblies. The kit includes everything you'll need to build the heli except the radio system, the piezo gyro and a 7-cell, 2000mAh battery pack. Allen wrenches, grease, lubricating oil, sandpaper and even a small tub to store small parts are included. No expensive heli radio is required to fly the Corona; a simple 4-channel radio with three microservos will do nicely. The included Electro-Fusion 7 motor and Fusion 35 ESC are specially made for this heli and are great matches for it.

When I first saw the very large assembly manuals (there are two of them), I thought this was going to be a complicated project—wrong! The first manual covers the construction of the heli, is loaded with text and illustrations and is very easy to follow. It's the most comprehensive helicopter manual I've ever seen. The 60-page operator's guide is just as detailed; it walks you through preflight preparation and trimming as well as instructions on how to learn to hover and other basic flight maneuvers.

ASSEMBLY

Crutch. Begin with the crutch assembly—the backbone of the heli. The plywood parts that make up the crutch are CNC-machined, and they fit together very well. After I completed the crutch, I gave it a light sanding and sprayed on a few coats of LustreKote white to protect the wood. As suggested in the manual, now is a good time to mount the servos you're going to use. I used JR 341 microservos, and they fit perfectly.

Canopy. The next step—assembling the canopy—is the most time-consuming, but it isn't difficult. The canopy is vacuum-formed in halves and must be cut from plastic sheet and glued together. Before cutting out the parts, I outlined the cut lines with a red felt-tip marker to make them easier to see. Take your time cutting out the parts and align them carefully before gluing them together, and everything will go together well. A dimple on each side of the canopy marks where to

SPECIFICATIONS

MANUFACTURER: Lite Machines

MODEL: Corona

TYPE: electric helicopter

WEIGHT: 2 lb., 12 oz.

MAIN ROTOR DIAMETER: 30 in.

LENGTH: 29.4 in.

MOTOR: Electro-Fusion 7 with Fusion 35 ESC (included)

RADIO USED: JR 8103 w/3, 341 microservos

GYRO USED: JR 410T

BATTERIES USED: 7-cell, 2000mAh

FLIGHT DURATION: 5 to 7 min.

PRICE: $319.99

FEATURES: parts packed as subassemblies; informative instruction and flight manuals; CNC-routed plywood parts; kit includes grease, oil, sandpaper and Allen wrenches.

COMMENTS: the Lite Machines Corona is a great little electric helicopter. It looks as though it has lots of parts, but it assembles very quickly. The parts are of high quality and fit together very well. The detailed building and operating manuals are loaded with information and make the helicopter experience truly enjoyable.

HITS

- Overall design.
- First-rate instruction and operating manuals.
- Easy to assemble.
- Excellent parts fit.

MISSES

- Canopy is time-consuming to assemble.

drill the mounting holes. The mounting hole on the right side is not used, and the manual doesn't mention it. Unfortunately, I found this out after I made the hole. One nice feature is that the canopy does not have to be painted unless you want to do so; the supplied decals do a great job of dressing it up.

Main rotor. I built the main rotor next, and it went together without a hitch. The manual's exploded diagrams make this a simple task. After I completed the rotor, I attached it to the crutch and balanced it as directed, which took very little effort. Again, the manual was very detailed and made a daunting task simple.

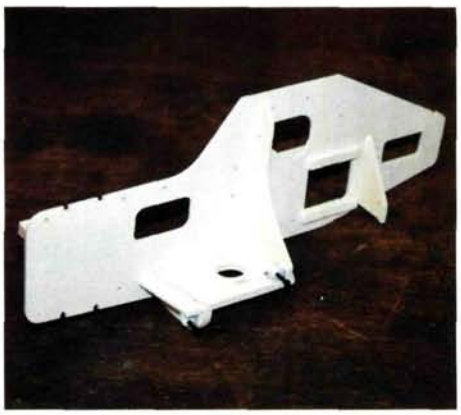
Tail rotor. The tail rotor is wire driven, and the wire is supported by two bushings

The Corona has lots of parts, but they're bagged by subassemblies for easy identification.

that you install in the tail boom. Be sure to thoroughly oil the bushings for the drive wire. The rest of the tail boom assembly is straightforward and uncomplicated.

Swashplate. The swashplate on the Corona is very simple in design and is made of metal for durability. It uses 16 balls for smooth operation, and it can be easily adjusted for wear. Extra balls were included in my kit; make sure that you use only 16 of them because if you try to squeeze in an extra ball, the swashplate will bind. Also remember to use the supplied grease to thoroughly lube the balls and the races they ride in.

Landing gear. I assembled the landing gear next and found it difficult to push the wire legs into the plastic skids. An examination revealed that burrs on the ends of the wires were preventing them from being easily inserted. A few swipes with a file fixed the problem. I then attached the landing gear to the crutch with the supplied nylon ties—a simple system that works very well



Top right: the canopy halves require a lot of cutting to remove them from the plastic sheet. I used a red felt-tip pen to outline the cut lines and make them easier to see. The canopy halves fit together very well.

Center right: the control system is uncomplicated and easy to assemble; the very detailed instruction manual makes this possible.

Bottom right: the crutch is made of various plywood parts that are CNC-routed. The parts fit together very well and require minimum sanding before you paint them.

FLIGHT PERFORMANCE

Because the Corona is fixed pitch and smaller than a .30-size heli, I waited until I had a dead-calm evening to make the first flights. I used the first few battery charges to hover the heli and make any necessary trim adjustments. Because I followed the setup instructions closely, the heli handled very well from the onset, and I only needed to make minor tracking and tail-rotor-pitch adjustments.

GENERAL FLYING

Despite its smaller size, the Corona is a great flying heli. Because the heli is fixed pitch, you control lift by changing the rotational speed of the main rotor rather than varying the pitch of the individual rotor blades. It took me a couple of battery charges to get used to the rotor speeding up and slowing down to match my inputs.

The Corona is very solid while hovering; it isn't twitchy when responding to cyclic control inputs. I started forward flight by first performing figure-8s to get used to the cyclic control response. As I grew accustomed to the feel, I continued to push the flight envelope. The Corona is pretty solid in forward flight, but you do need to hold some forward cyclic to prevent the nose from pitching up. I continued pushing the Corona to fly faster and faster and did some hard right and left turns; the Corona handled them well, but you need to push the heli through the turns.

Coming out of forward flight is easy, but you must plan your approach path and adjust it by modulating throttle and fore/aft cyclic to land at your chosen spot. Remember, this is a fixed-pitch heli; don't remove too much throttle, or the rotor speed will decay and cyclic control will be lost.

AEROBATICS

I found the tail rotor to be very powerful and responsive. Hovering pirouettes were graceful, and if you use a dual-rate gyro, 540 stall turns will be easy to accomplish. Aerobatics are limited but possible. Loops can be performed, but you need to build up speed to carry the heli through the maneuver. The same applies to rolls, and they will be more like barrel rolls than axial. I have flown the Corona pretty aggressively for some time now, and it has held up very well and requires very little maintenance.

on this heli. The fore/aft control arm and swashplate are then added, and the Corona is ready for final assembly.

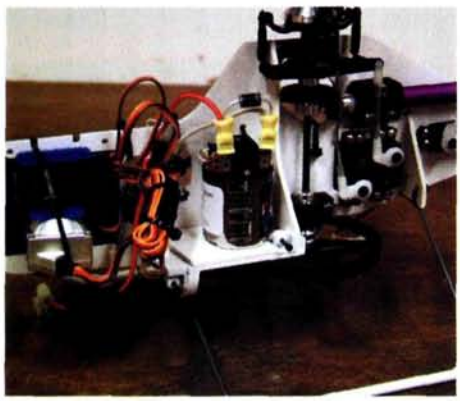
FINAL ASSEMBLY

Now is the time to mount the subassemblies on the crutch. First, the rotor assembly is mounted on the main shaft, and then the shaft is adjusted so there is no vertical movement in it. I attached the tail boom next and adjusted the gear mesh as directed. The Corona was starting to look like a helicopter! Before you install the Electro-Fusion 7 motor, it's a good idea to break in the motor to seat the brushes. I hooked up two D-size cells (dry cells) to the motor and let it run until the batteries were exhausted.

I fastened the pinion gear to the motor and then mounted the motor on the crutch. I attached the main gear to the main shaft and then adjusted the gear mesh. After you've installed the motor and set the gear mesh correctly, be sure to remove the pinion gear to prevent the main rotor from starting unexpectedly when you make your initial radio adjustments.

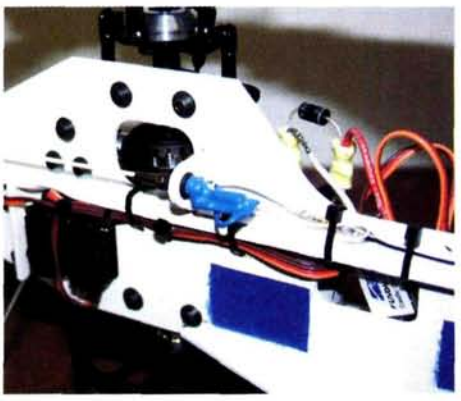
I mounted the receiver and gyro on the crutch using hook-and-loop fastener as recommended. This works very well for the receiver, but I felt the gyro needed a more stable platform, so I added a plywood mount for the gyro. I next added the rest of the radio system and adjusted it. The manual instructs you to hook up the ESC and drive battery to power up the radio; instead, I used a receiver battery plugged directly into the receiver. The manual goes into great detail concerning how long each pushrod should be and how to properly adjust them for each control. Lite Machines gets an A+ for the setup instructions.

I feel that it's much easier and safer to arm the ESC for the first time without the possibility of the main rotor's turning, so I removed the pinion gear first. This way, I'm able to test the ESC for correct operation, making sure that it stops at full low throttle and that the motor is turning in the proper direction. Once I become familiar with how the ESC works, I'll reinstall the pinion gear. I've never had an



A place for everything and everything in its place. Despite its small size, the Corona's equipment layout provides ample room for the servos, motor, receiver and gyro.

The tail-rotor pitch is controlled via a pitch wire that runs through the output shaft. It's a design that's simple and easy to maintain. To minimize wear, be sure to keep the pitch wire thoroughly lubricated.



To prevent the antenna from being tangled in the main or tail rotor, I used a Deans whip antenna. You cut the receiver's antenna about 5 or 6 inches long and then solder a connector to it. The receiver antenna is then plugged into the whip antenna. Mine has worked flawlessly.

SETTING UP GYROS AND MAKING "SENSE" OF THEM

When you build a helicopter for the first time, it can be very confusing to set up the gyro. Here's a quick and easy way to set up a standard (not a heading-hold) gyro.

1. Make sure that the tail-rotor blades move in the proper direction for your stick inputs. Remember that you fly the nose of the heli: if you push the stick to the right, the nose of the heli should also move to the right. Rotate the tail blades until they are vertical and then swing the top blade back so that it points to the rear of the heli. Now move the rudder stick to the right. The top blade should move to the left—opposite to the stick input. If the blade moves in the same direction, use the servo-reversing feature of your radio to change the direction of the servo.

Unlike most helicopters, the Corona's tail blades do not swivel, so this step is not necessary. You can check for proper blade movement by moving the rudder stick to the left; the blades should increase in pitch so they pull the tail to the right.

2. Install the gyro and make its connections following the gyro's instructions. If the gyro has dual rates, insert the auxiliary plug into the appropriate channel on the receiver. Again following the gyro instructions, turn up the sensitivity on one rate to 100 percent, and turn the other down to zero. If your gyro has only one rate, turn it to 100 percent.

3. Now look at the tail-rotor servo, move the transmitter stick to the right and note in which direction the servo arm moves. Pick up the heli by the main rotor head and quickly swing the heli to the left while you watch the tail-rotor servo. The servo arm should move in the same direction as the right stick input. If the servo doesn't move at all, flick the dual-rate switch on the transmitter and repeat the test. If the arm moves in the correct direction, you're all set. If it doesn't, you need to reverse the direction of the gyro sense only, not the servo direction. Most gyros have a reverse switch, so it's a simple matter to move the switch. When the gyro is working correctly, reset the sensitivity as recommended in the manual.

It's very important that you perform this test. If the gyro is working backward, the first time you try to hover the heli, it will start to pirouette very quickly and you'll most likely damage it. That's all! After you've gone through these steps a few times, you'll see that it isn't difficult at all to set up a gyro.

Pivoting tail-rotor blades.

The Corona's fixed tail-rotor blades.

accidental startup with an electric helicopter using this process.

When everything was installed and working, I checked each step in the manual against the heli to make sure that I didn't miss anything when I built the model. Everything looked good and was ready for the first flight.

FINAL THOUGHTS

Lite Machines has developed a fine beginner helicopter; it is well thought out. The instructions are excellent, and they contain a lot of information to help the modeler understand all of the helicopter's systems. The quality of the parts is first rate, and they all fit together well. I wouldn't hesitate to recommend the Corona to anyone who wants to learn to fly helicopters. ✦

JR; *distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.*
Lite Machines *(765) 463-0959; litemachines.com.*
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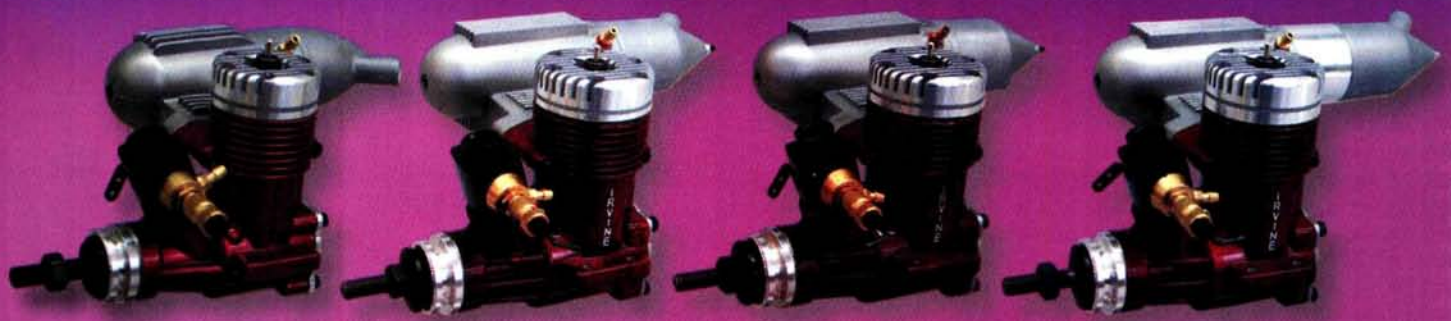

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Dymond Modelsports

Jodel Bebe

by Bob Van Tassel

The Jodel Bebe's roots can be traced to Edouard Joi and his son-in-law Jean Delemontez. After WW II, the pair realized there was a need for an inexpensive trainer. They designed and built the B9, which was the prototype for the Bebe. That plane was an immediate success, and it became a popular trainer. Over the years, it was continuously upgraded; today, it is a 4-seat aircraft with a fully enclosed cockpit.

Dymond's version of the Bebe proves that an airplane doesn't have to be big to be beautiful. It's a clean, crisp, no-frills model. From the light fiberglass fuselage to the built-up balsa wings and tailpieces that come already covered with Oracover, right down to the preshaped landing gear, this little plane is an excellent reproduction. It also comes with all of the necessary hardware.

ASSEMBLY

There isn't much assembly required to complete the airframe; I spent most assembly time on the flight system and controls.

I started with the one-piece wing that has preinstalled dihedral at the tips. It comes nicely covered in two-tone red and white Oracover film over built-up balsa ribs. The ailerons are prehinged, and there's a servo well on the underside of each wing for a sub-miniature servo. A chase in the ribs extends from the servo well to the root rib for the servo leads.

Simple, speedy and famous French flyer

SPECIFICATIONS

MODEL: Jodel Bebe

MANUFACTURER: Dymond Modelsports

TYPE: scale electric park flyer ARF

WING SPAN: 36 in.

WING AREA: 277 sq. in.

WEIGHT: 27 oz. (with battery)

WING LOADING: 17.15 oz./sq. ft.

LENGTH: 24 in.

MOTOR: Speed 400 Night Hawk

PROP: APC 9x6

RADIO REQ'D: 4-channel (elevator, rudder, ailerons and speed control)

RADIO USED: Futaba T6XA transmitter, Hitec RCD micro 535 receiver, four Dymond submicroservos and a Dymond D20A ESC with BEC

BATTERY: Sanyo 7-cell, 600mAh pack

PRICE: $119

FEATURES: lightweight, fiberglass fuselage; built-up balsa wings; nicely covered with Oracover.

COMMENTS: this is a zippy, fast-moving flyer that is best suited for a modeler with some flying experience under his belt. The Jodel Bebe is an interesting model of a unique airplane, and it goes together fairly quickly.

HITS

- High-quality construction.
- Excellent covering.

MISSES

- Motor is a tight fit.

FLIGHT PERFORMANCE

I balanced the model on the main spar, which is 2¼ inches back from the leading edge. I set the rudder throw to 1 inch, the elevator to ½ inch and the ailerons to ⅜ inch.

TAKEOFF AND LANDING

Because I fly from a grass field, a hand-launch was necessary. I do feel, however, that the Bebe would have no problems taking off from a hard surface. To hand-launch, hold the plane high above your head and make sure that your fingers are well to the rear of the trailing edge. Take two steps forward and gently release the plane. The Bebe flies off smartly, gaining altitude at ½ throttle, and it doesn't have any bad characteristics. With some minor trim, it handles difficult wind conditions surprisingly well. Most of the flying can be accomplished at ½ throttle.

When the motor starts to slow down, begin a standard landing procedure and prepare for the final approach. The plane settles in very nicely for landing.

LOW-SPEED PERFORMANCE

This plane flies at a very respectable speed; it's definitely not a floater. It's best suited for someone with at least a little experience. It can, and does, perform slow rolls and loops, and inverted flight can be accomplished with minimum elevator correction. Its flight stability is surprisingly strong even in windy conditions, and its speed remains constant even in crosswinds.

HIGH-SPEED PERFORMANCE

There isn't much difference between low-speed and high-speed performance. This plane can cover a surprising amount of territory in a comparatively short time—more than you would expect from a plane of this type.

AEROBATICS

The Bebe is by no means an aerobatic performer, but basic aerobatics such as loops, rolls and inverted flight are all within its capabilities. The plane has stability with no bad characteristics.

Dymond suggests that you cut the servo connectors off the servo and then solder and tape the connection onto one end of the servo extension. By staggering the cuts, you can eliminate the possibility of a short circuit. I secured the microservos with double-stick tape and attached the control horns to the ailerons with some lightweight, plastic-coated wire that I picked up at my local hobby shop. I find it very easy to work with the lightweight wire pushrods in these park flyers because I can bend the wire to make adjustments very easily. I put in a small V-bend for rigidity and to allow for adjustment.

I opened the slot for the landing-gear wire, and after gluing the gear into place, I covered the slot with white electrical tape. I glued the two-piece plastic wheel together using thin CA, and I painted the hubs with yellow acrylic paint. I used small pieces of heat-shrink tubing to hold the wheels in place.

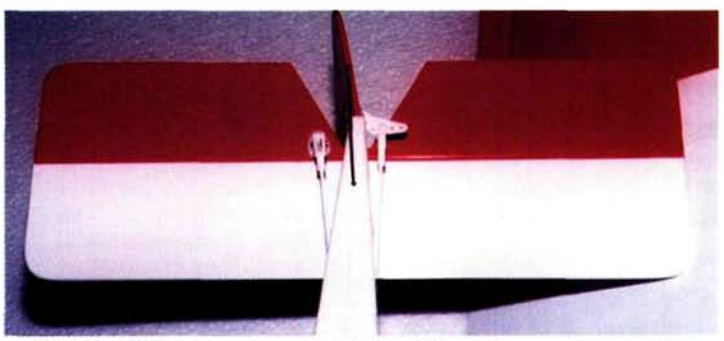
The fin and rudder come prehinged, as do the stabilizer and one-piece elevator.

The Jodel Bebe comes with everything you see here, plus a complete hardware package. It has a lightweight fiberglass fuselage and a built-up balsa wing covered with Oracover.

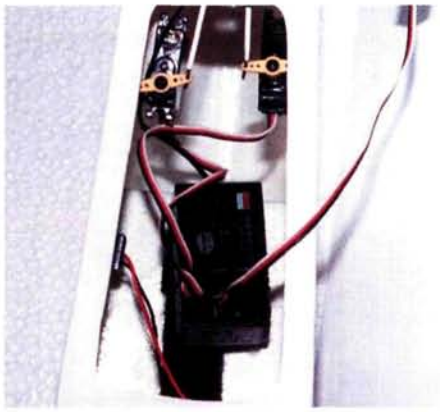
The fin fits into a precut slot in the stabilizer. After checking the alignment, I glued the fin to the stabilizer and the assembly to the fuselage using 5-minute epoxy. Next, I mounted the control horns on the rudder and elevator and cut slots in the rear of the fuselage for the rudder and elevator pushrods. I attached the microservos to the inside of the fuselage with double-stick servo tape and then attached the pushrods to the servos.

MOTOR ASSEMBLY

The next step was to connect the power wires to the motor. I shaped the firewall and trial-fitted the motor assembly into the fuselage. It took many attempts to get it to fit the way I wanted it. Because it's a very confined space, an assortment of tools was required to accomplish this task. When I was satisfied with the fit, I drilled the hole for the prop shaft and mounting holes. I then slid the completed assembly into the



All of the tailpieces come prehinged. I used 5-minute epoxy to secure the entire assembly. Installation of the control linkages is done in the standard manner.



Installation of the radio gear took the most time, and even that wasn't difficult. I mounted the servos to the inside of the fuselage with double-stick tape, and I used hook-and-loop faster to attach the micro receiver to the underside of the cockpit.

fuselage and secured it, making sure not to allow the machine screws to penetrate too deeply and possibly jam the motor armature.

I painted the supplied pilot figure with flat acrylic paint and secured it in the cockpit with double-stick servo tape.

RADIO INSTALLATION

I cut a slot in the left side of the fuselage for my miniature switch and attached my Hitec RCD micro receiver to the underside of the cockpit with self-stick hook-and-loop fastener.

I attached the wing to the fuselage using a small metal dowel in the leading edge; it fits into a hole in the fuselage bulkhead and is secured with a nylon screw in the rear. I then attached the prop and installed the battery pack.

CONCLUSION

Dymond's Jodel Bebe combines a great deal of versatility with a small price tag to create a really appealing package. It's fairly simple to assemble and truly a joy to fly. ✈

APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.

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ELECTRIC P-51 Mustang

SPECIFICATIONS

MODEL: P-51 Mustang

TYPE: sport-scale electric

WINGSPAN: 42 in.

WING AREA: 300 sq. in.

WEIGHT: 45 oz.

WING LOADING: 21.5 oz./sq. ft.

MOTOR USED: Magnetic Mayhem Reverse Motor w/Master Airscrew 3.5:1 gearbox

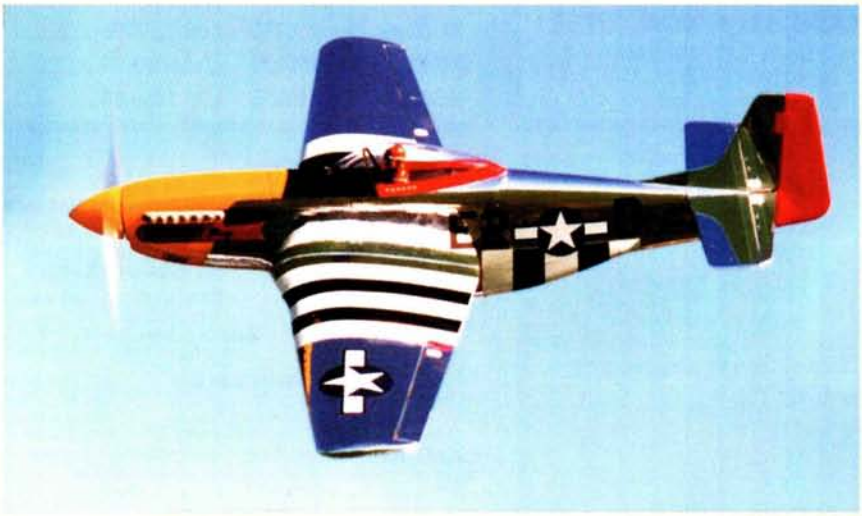
BATTERY USED: 10-cell, 1250mAh SCR

PROP USED: APC 12x10 E Power prop

RADIO USED: 3-channel (throttle, aileron, elevator)

COMMENTS: designed by Mark Rittinger, the Electric P-51 is a semi-scale Mustang that can be built in many versions. It's quick to build and great fun in the air. The foam, balsa and ply model flies well, thanks to its semisymmetrical wing and high power, and it really excels at high-speed maneuvers.

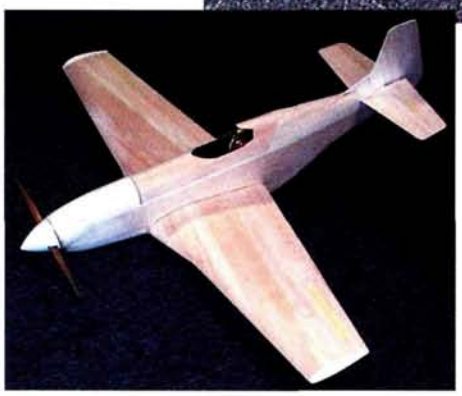
Reno Racer or WW II fighter. Have it your way



Above: here's the Reno Racer rounding pylon number one and breaking another speed record. Right: the Electric Mustang can be built as any version you desire. Here, the popular D bubble-canopy version makes a flyby. Looks great!

by Mark Rittinger

I have been modeling for more than 20 years, and for the past four years, I've been into electric planes. Their convenience, cleanliness and fun quotient can't be beat. I also like designing electric scale airplanes that are light, tough and easy to build and, most important, fly well. Many times, that's a tall order for one airframe to accomplish, but I think it has been done with this Mustang.



Above: the Reno Racer completed and waiting for its first flight. Left: here's the completed airframe; construction is easy. This is the Reno Racer version, and details for this model are on the plan.

With a Master Airscrew gearbox geared 3.5:1, a 10-cell 1250 SCR battery pack and a 12x10 prop, this 42-inch-span model flies wonderfully well! It's very smooth and has fantastic vertical performance. With throttle management, I can get 6-minute flights. With the throttle wide open, a flight lasts about 4½ minutes. If you're looking for a scale P-51 and have been thinking of trying electrics, this is the plane for you! The plan has details to build an A, B, C, or D version of the Mustang, plus a Reno Racer for you race fans.

LET'S GET STARTED

For the wings, you'll need 2-inch-thick pink foam; I bought a 4x8-foot sheet from a home-supply store for about $20. To keep the weight down, use only high-quality balsa, and limit your use of epoxy. Remember to "think light" while building, and don't omit anything from the airframe. It's designed so that many pieces do more than one job. You'll also need various thicknesses of balsa for the wing skins, hatch, fuselage and doublers and fin and stab, plus miscellaneous triangles and blocks. For equipment, you'll need at least a 3-channel radio, a 10-cell battery pack (1250 SCRs are a good starting point), a Master Airscrew 3.5:1 gearbox, a Magnetic Mayhem Reverse motor from Kyosho and a 30A ESC with BEC.

FUSELAGE CONSTRUCTION

The fuselage is simple to build. Begin by cutting out the fuselage parts to make a "kit." Make the fuselage sides oversize on the top rear to allow it to curve over the rear deck. Now glue the doublers to the sides and add the ⅛-inch plywood firewall (no right thrust), former F2 and the ¼-inch triangle stock to the right fuselage side.

Depending on which version you build, install the appropriate F3B (bottom) and F3M (middle) formers. Glue the correct F3T to the top of F3M, and add the ½-inch triangle stock behind it along the bottom of both fuselage sides, as shown on the plan. Line up and glue the left fuselage side to the formers and the motor mount. Now install the

FLIGHT PERFORMANCE

TAKEOFF AND LANDING

Fully charge a 10-cell pack and check the control surfaces for correct movement; also do a range check with the motor running. If all is well, get going! Have your helper point it into the wind, about 10 degrees nose high with the wings level, and give it a running toss with the motor at full speed. If you built the airframe straight, you'll be rewarded with a steep climb-out to altitude.

The model handles well at landing speeds, but landings can be tricky with the radiator scoop hanging down. I line up on the runway centerline and slow the P-51 down until it coasts along. On final, reduce power to about ¼ throttle, and cut the throttle just before touchdown. You'll have no problems. Typically, I land the model with enough power left in the battery for a go-around, if one is needed.

LOW-SPEED PERFORMANCE

With the scale wing area, the wing loading can be fairly high. Here's where the washout in the wing really helps. The plane stalls and drops a wing at around 15mph. The stalls are sudden, though, so it's best to keep the airspeed up. It is surprising how well the Mustang glides with the scale wing and stab areas. Don't be afraid of them; they work great.

HIGH-SPEED PERFORMANCE

The P-51 handles well at high speeds and has a top speed of around 55mph. The model has a scale "sit" in the air that just looks right. Full-throttle applications will reduce flight time. The higher speed provides the inertia for large aerobatics. Expect flights of 4½ minutes with a 1250 SCR battery pack.

AEROBATICS

The Mustang will do nice, large loops from level flight, even late in the flight. Rolls, split-S's, Cuban-8s, Immelmanns and all other aileron/elevator maneuvers are nice and smooth. A rudder would add more maneuvers to the repertoire, but it isn't really necessary. I really like doing a high-speed shallow dive followed by a banking turn past the flightline and a slow-roll finish. Great fun! The gearbox really sounds like a turbocharged Merlin!

1/8-inch-ply nose ring and 1/4-inch sheet in the nose. Install F4 and add the top stringer, and then wet the fuselage sides and roll them over to form the top deck and glue them to the stringer. Now sheet the bottom of the fuselage with 1/16-inch balsa used cross-grain.

Make the front blocks and tack them into place with a few drops of CA. Carve them to shape, then remove and hollow them out to a wall thickness of 1/8 inch. I make the bottom front a little thicker; it takes a beating during landings. When finished, permanently glue the blocks to the fuselage. Add the 1/4-inch square in the cockpit area, and the basic fuselage is complete.

THE HATCH

The hatch is built on the fuselage and is simple to construct. Pin the hatch floor to the fuselage and attach the hatch front; don't forget the gussets. Make the rear bulkhead by placing a piece of paper on F3T and tracing around it. Mark off 1/16 inch inside of that, and it becomes the pattern for the rear bulkhead hatch. Make the rear bulkhead from balsa and glue it into place, and then sheet the assembly with 1/16-inch balsa.

The wing sections are cut from 2-inch-thick pink foam. The outer and inner sections are cut individually and then glued together.

Save the foam beds that the cores are cut from; you can use them as jigs to glue the sections together. The beds are also needed to sheet the panels with 1/32-inch balsa.

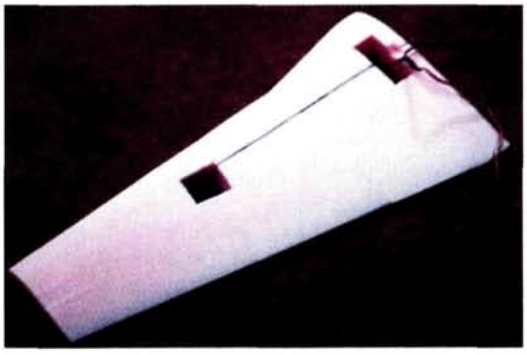
THE WING

Because of the wing's shape, it's made in four sections and is cut from 2-inch pink insulation foam. Do not use white foam; the compression strength is different. Cut the templates from 1/32-inch ply, and make the inner section of the wing first; use the root and center templates for these. Now use the center and tip templates to make the outer panels with 1/8-inch washout in each tip. Save the beds from the cores; you will need them later to sheet the wing.

Join the inner and outer sections of the wing-cores with white glue or epoxy; make sure they're straight. Now cut out the servo pockets and handhold areas, and make a 3/8-inch-deep cut with a sharp knife from the root to the pockets. Carefully push the Y-harness for the aileron servos into the cores so the servos are just below the surface of the foam.

To sheet the cores, I use Southern Sorghum wing-core glue. Because I find it difficult to edge-glue 1/32-inch skins, I tape them together and lay them on the core bed. I then coat the bottom of the wing-core and the sheeting with the wing-core glue. When the glue has set, I carefully put the wing-core on the sheeting, being careful not to induce warping. Repeat the process to sheet the top of the wing. Once both panels have been sheeted, check them for warps (other than the required washout).

After you've sheeted both panels, block up the tips 1 5/8 inch and sand the dihedral angle into the roots. Glue the panels together, making sure that each panel has the proper dihedral. For strength, wrap the center joint with nylon tape and apply a light coat of epoxy. Sand the leading edge of the wing flat and glue on the 1/8-inch leading edge. Add the wingtips and sand the leading edge to shape. Do not make it too sharp; a rounded leading edge performs much better! Mark the aileron locations and then cut them out of the wing; be sure to allow for the thickness of the facings.



Before sheeting the panels, cut a channel in the bottom of it, and install the Y-harness for the aileron servos.

Fuselage construction is very easy. A minimum of bulkheads is used, and the sides are made from a single sheet of balsa.

Glue the facings onto the wing and the ailerons, and the wing is complete.

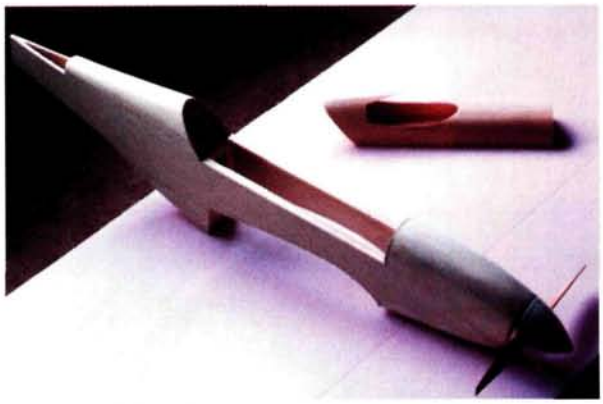
TAIL FEATHERS AND FINAL ASSEMBLY

The tail group is built of ⅛-inch, medium-grade sheet balsa; use balsa that is flat and warp-free. You can use the scale hinge line with the counterbalances, or just use a straight hinge line as I did. Before you glue the stabilizer and fin to the fuselage, fit the wing into the wing saddle, and sand the saddle until you achieve a nice tight fit. Now, center the wing in the fuselage (measure from both wing-tips to the rear of the fuselage), and glue the wing into place with epoxy. Let it cure thoroughly before disturbing it.

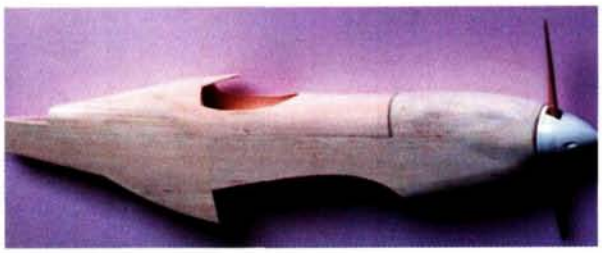
Align the stabilizer on the rear of the fuselage and check that it's at zero degrees incidence. (Both the wing and stabilizer should have zero incidence.) Once you're sure it is correctly aligned, glue the stabilizer onto the fuselage. Use a triangle to align the vertical fin, and glue it to the fuselage. Now add the light balsa filler pieces to both sides of the fin, finish-sand the airframe, and it's ready to cover.

Now is a good time to install the radio gear. First, slide the motor into the bottom hole of the motor mount and install the gearbox from the other side. Using two-sided tape, install the elevator servo (with the pushrod already attached) in the fuselage behind the wing. To save a little weight, I removed the case from the receiver and installed it with hook-and-loop fastener, as shown on the plan. The aileron servos are

Continued on page 88



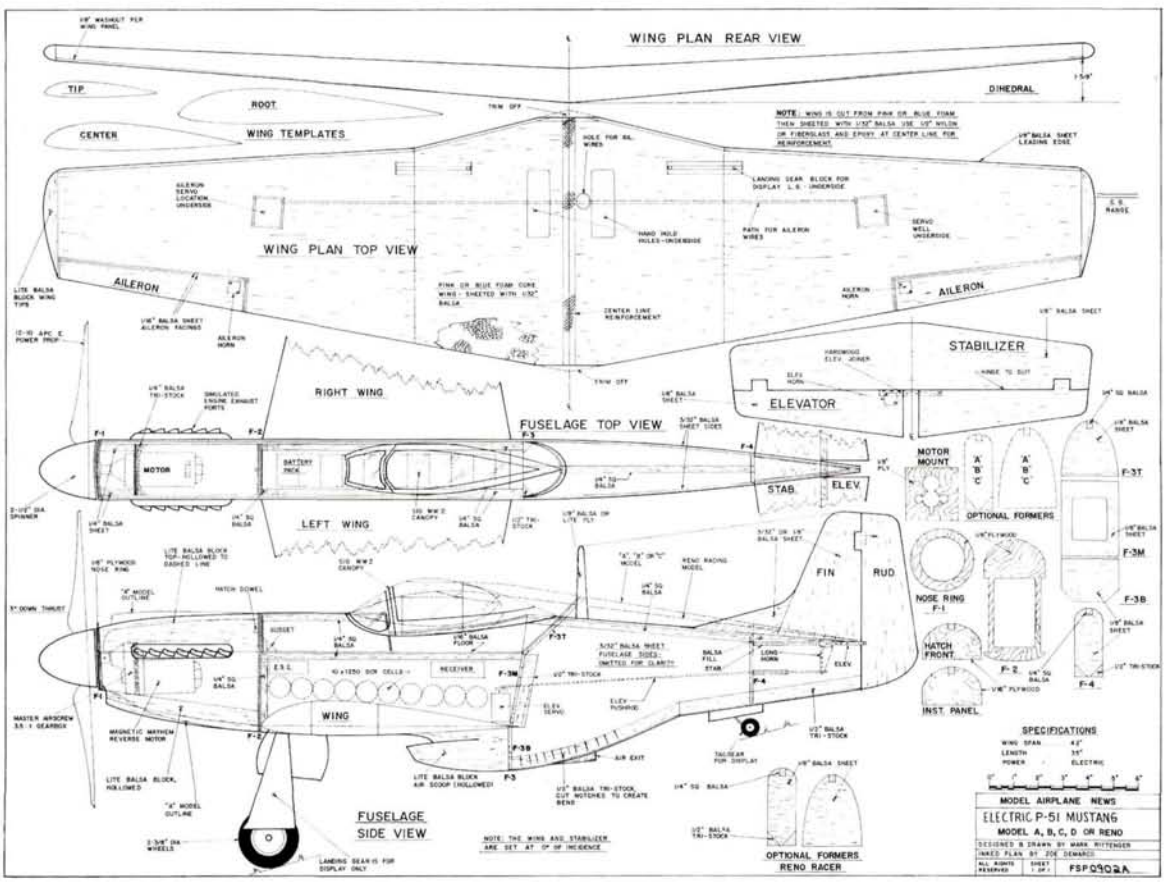
Above and below: the fuselage is completed and ready to have the wing and tail feathers attached to it. The removable hatch allows easy access to the interior of the fuselage. This is the Reno Racer version.



Electric P-51 Mustang

FSP0901A

Designed by Mark Rittinger, the Electric P-51 is a semi-scale Mustang that can be built in many versions. It's quick to build and great fun in the air. The foam, balsa and ply model flies well, thanks to its semi-symmetrical wing and high power, and it really excels at high-speed maneuvers. WS: 42 in.; L: 35 in.; power: 540-type motor; radio: 3-channel; 1 sheet; LD 2. **$19.95.**



To order the full-size plan, turn to "RC Store.com" on page 146.

Continued from page 84

also secured in the pockets with two-sided tape and get hooked up with standard hardware. Add the 10-cell battery pack and adjust it to get the correct CG. I recommend that you use the forward CG for your first flights; the plane has a scale stabilizer, and it doesn't tolerate a rearward CG very well. Set up the control throws as follows: use ¼ inch up and down for the ailerons and 5/16 inch for the elevator throw. For best performance, I use an APC 12x10E prop; Master Air-screw 12x10 wooden props also work well.

To save weight, cover the Mustang with your favorite plastic film. On the wing, I recommend that you use a low-temperature film like Econocote. Pink foam swells rather than melts when too much heat is applied. You risk damaging the sheeting if you use a high-temperature film. Use your favorite method to hinge the ailerons and elevators.

The motor and gearbox are mounted on a plywood bulkhead. For convenience, mount them early in the fuselage construction.

The nose of the Mustang is built of light balsa blocks. I tack them into place and then carve and sand them to shape. Tacking them into place allows you to remove them and hollow them out.

CONCLUSION

I hope you enjoy building and flying the Electric P-51 as much as I do. It's definitely my favorite! Time will tell whether electrics will ever match the performance of glow- and gas-powered models, but one thing is sure: build this Mustang, and you'll change people's opinions of electric RC planes being slow, lumbering models that can't get out of their own way!

Till next time: watch your six!

APC Props; *distributed by Landing Products (530) 661-0399; www.apcprop.com.*

Econocote; *distributed by Great Planes Model Distributors Co. (800) 637-7660; www.greatplanes.com.*

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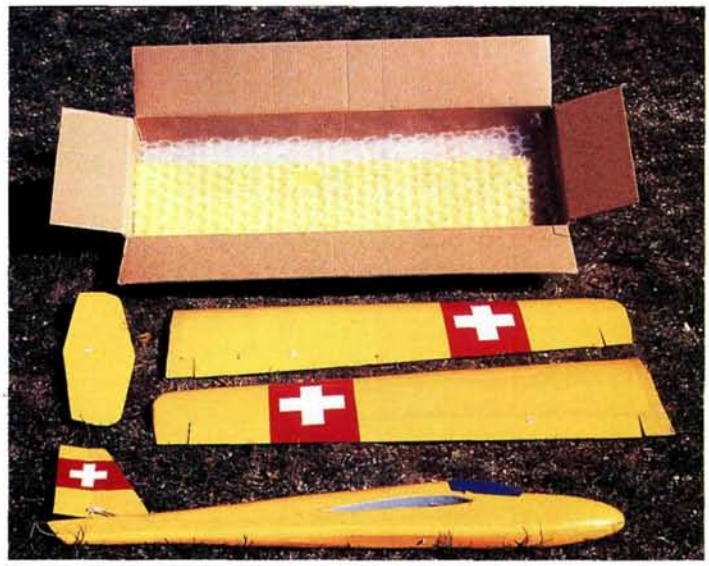
Modify Wings and Tails for Easy Transport

Add convenience without sacrificing strength

by Dave Garwood



The Dave's Aircraft Works Schweizer 1-26 set up with split wings and removable stab and broken down for packing. Its components are not much larger than the original kit's major parts.

"Hey man, how'd you get that plane to fit back inside the original box?"

"I modified the design to make a two-piece wing and removable stabs."

If you've ever needed to ship a plane, you've been amazed by how big a box it takes to pack a one-piece wing and a fuselage with the vertical and horizontal stabilizers fixed in place. On the other hand, a two- or three-piece wing will fit in a pretty small package, and a fuselage with removable horizontal stabilizers will fit in a reasonably sized box for shipping and storage. The wings and fuselage will also fit in a small car, and you can take more planes from the hangar to the flying site.

Designers sometimes provide for only a one-piece wing and fixed stabilizers, so we have to do a little aftermarket engineering to easily transport the plane. Here's how.

WORKING WITH WINGS

• **With a spar.** If the wing has a spar, the task is relatively easy: simply replace the joiner parts with brass tubes and a steel or carbon-fiber wing-joiner rod. Attach one tube to each spar joint at the wing root, usually where the wing joiner would have gone; when you assemble the wing, the joiner rod provides the strength to support the wing halves. Simple concept; the only problems are how strong and what size the replacement parts need to be, and how you'll attach them to the spar.

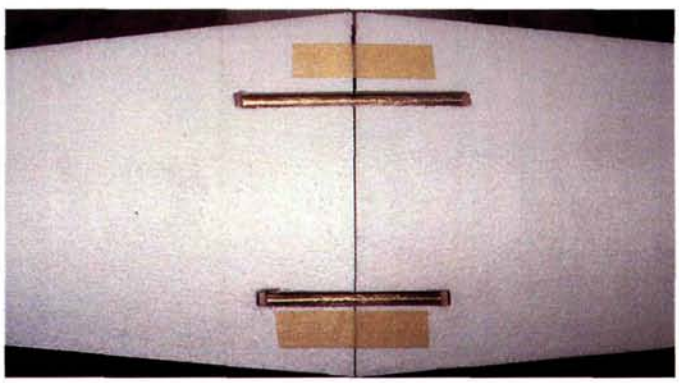
Take a look at your original wing-joiner part; perhaps it's a precisely cut, ¼-inch-thick plywood part, "bent" so it sets the wing dihedral when installed. We need something as strong as the joiner part, and luckily, the hobby store has it: hardened steel wire, often called "piano wire." The hobby shop also has brass tube for making the wing-rod receiver tubes.

Generally, piano wire of the same diameter as the thickness of a plywood joiner (or slightly smaller) will provide plenty of strength. While you're at the piano-wire rack, select brass tube that slides over the wire you've selected. The original length of the wing joiner provides a guide to the length needed. Plan your replacement joiner parts to be the same length as the original part or a little shorter, if you're concerned about the additional weight of the brass and steel.

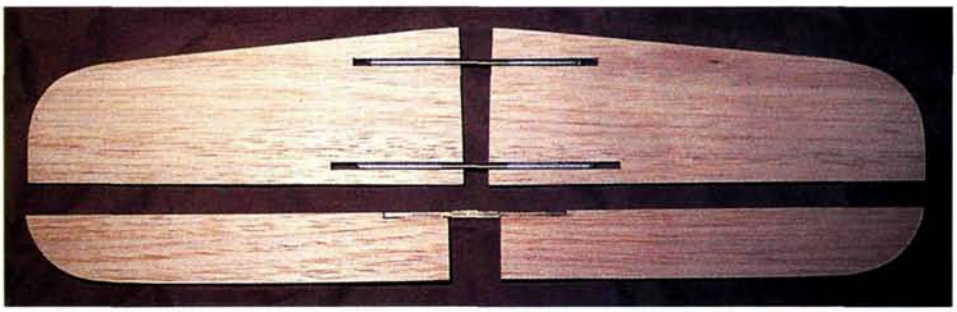
Complete construction of the wing up to the point at which you're ready to join the wing halves. You'll use epoxy to attach the brass wing-rod receiver tube to the spar. You'll be setting the wing dihedral when you epoxy in the brass tube, so work carefully during this operation.

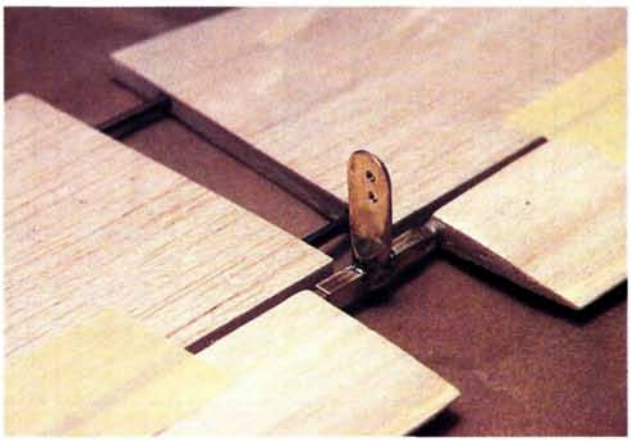
Don't cut the brass tube in half yet; it's easier to align if you install it in one piece and cut it with a razor saw or a hacksaw after the epoxy has set up. Put a small piece of masking tape over the ends of the brass tube to keep epoxy out. You may want to install a small plywood or hardwood block at each end of the brass tube to serve as stops for the wing rod.

Set up the wing halves with blocks to hold the specified dihedral, install the brass tube with a bit of epoxy and let it cure overnight. Next day, liberally fill the grooves between the tube and the wing parts with more epoxy and let everything cure overnight again. If you're concerned about the strength of the epoxy bond, add milled fiberglass or the chopped cotton fibers known as cotton "flox" for an even stronger bond. Of my five split-wing installations on planes with spars, I've had only one wing joint break in a crash, and the spruce spar had split; the epoxy joint did not fail.



Above: Vortech Models' FW-190D with brass wing-rod receiver tubes installed in slots in foam-cores, with wing-rod stop blocks at each end. The tubes are sanded to give the epoxy a better grip. Left: here is Dave's Aircraft Works' EPP-foam Schweizer 1-26 set up with split wings and a removable stab. The horizontal stab is bolted to blind nuts under a small plywood plate that's mounted to a "shelf" on the fuselage.





Above: the FW-190D's horizontal stabs with slots cut and tubes installed with epoxy. Note the square brass tube for the elevator control linkage. Right: Vortech Models' FW-190D's horizontal stabs, showing a closer view of the square-tube-within-a-square-tube elevator linkage. This allows the stabs to be slid off when the sailplane is disassembled.

When the epoxy has cured, carefully cut the brass tube with a razor saw or a hacksaw to separate the wing halves, then dress the cut ends of the brass tubes with a flat file or sanding block. Slide in your steel wing rod and check the fit. You may want to install a separate alignment pin between the wing halves to keep one wing from turning around the wing rod while you hold the other.

• **Without a spar**. In the case of a foam-core wing that doesn't have a spar, you'll need to do a little more aftermarket design and construction work, but the principle is similar: at the place where you would normally join the wing halves, install a brass tube to receive the wing-joiner rod. Slightly more building is needed to tie the wing rods into the wing skins. Remember, the outer skins provide strength and stiffness to foam-core wings that don't have spars.

If the wings are already sheeted, mark carefully and cut out a slot for the brass tube in each wing root. If the servo installation allows, make the cut at the thickest part of the airfoil. Line both sides of the slots with balsa sheet, with the grain perpendicular to the span. Install the (uncut) brass tube between the vertical-grain balsa slot liners, with two rounds of epoxy as in the previous section. Remember, you're setting the wing dihedral when you install the tube.

When the epoxy has cured, you need to fill the slots to the top and bottom surface of the wing; use a mixture of epoxy and microballoons on heavy planes and household spackle on light planes. When this has cured or dried, sand the filler to match the curve of the airfoil and apply the wing finish covering.

If you have a tough time sanding this to the right shape, try installing your wing-rod tube in the foam-cores before you sheet the wing. The same principle applies: tie the tubes to the top and bottom skin for strength. You can do this with or without the balsa side pieces. To eliminate the balsa parts, make the slot in the wing-cores just wide enough to grip the tube gently. Install the end blocks and attach them to the cores with a mixture of epoxy and microballoons. Fill the slots to the surface of the foam-cores, and cover them. To avoid creating stress points at the ends of the tubes, I sometimes add a layer of fiberglass over the tube area and under the wing skin.

If you think the steel and brass parts will add too much weight, you can substitute lighter materials, such as carbon-fiber joiner rod and aluminum tube. Remember that of three desirable characteristics of model building materials—high strength, low weight and low cost—you can choose any two. Sometimes with no-spar wings, I install a pair of wing-joiner rods; this spreads the load across the wing skins, and when both rods are installed, the one wing half doesn't spin on the rod when you hold the other.

I've installed aluminum joiner rods on one and steel joiner rods on seven foam-core wing planes, and the wing always broke somewhere else if it crashed. For 40- to 50-inch-span planes, I use ¼-inch-diameter, 7- to 8-inch-long piano wire and 5/16-inch-diameter brass tubes. For 60- to 72-inch-span planes, I use 5/16 case-hardened wing-rod stock about 9 or 10 inches long (or two 6-inch rods) and 3/8-inch-diameter brass tubes.

With the split-wing modification, the disassembled wing half-span is likely shorter than the length of the fuselage, allowing it to be stored in a much shorter box.

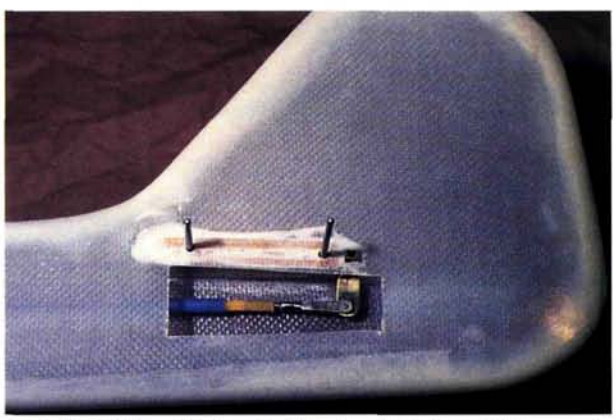
The next step is to modify the horizontal stabilizers so they are removable.

REMOVABLE HORIZONTAL STABILIZERS

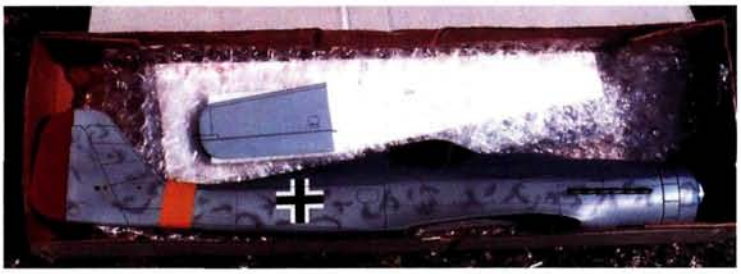
The stabs are removable by design on every modern open-class fiberglass sailplane I've seen and on many 2-meter-span sailplanes. All I do is build and mount them the way it's done on big sailplanes. Again, the concept is simple; this time, a pair of joiner wires fits into receiver tubes in each stab half. Install the receiver tubes when you build the stabilizers. If the stabs are solid balsa, cut slots and fit brass or aluminum tubes with epoxy. If they're foam-core, install them the same way as you set the receiver tubes into foam-core wings.

I generally use a pair of 1/16- to 1/8-diameter wires for joiner rods, depending on the size of the plane. Sailplane designers have used carbon-fiber rods to save weight in the tail, but some have recalled them because it's difficult to detect whether they're cracked or otherwise damaged; these designers suggest returning to steel joiner rods. If you're a careful worker, you can substitute aluminum receiver tubes for brass.

To mount the stabs to the fuselage, the stab joiner wires run through short lengths of brass tube set into the rear of the fuselage, often inside a molded vertical stabilizer. We may need to strengthen this mount, as connecting only to the external skins on



The FW-190D's molded vertical fin showing balsa reinforcement of the horizontal stab wire holder area. The small hatch cut for access is replaced before the fuselage is final-painted.



FW-190D set up with split wings and removable stabs. This 52-inch-span plane easily fits back into the original kit box.

the fuselage or fin may not be sufficiently strong and rigid. This can be done by inserting a small balsa block inside the fuselage or fin, with the balsa grain running cross-wise, then drilling the holes for the center brass tubes. If greater stiffness is desired, add some expanding "foam-in-a-can."

If the elevator control linkages on your model exit the fuselage at the rear, the elevator linkage is unchanged; simply connect the clevis to the elevator control horn when you assemble the plane. If you have an internal elevator control horn, then one more phase of aftermarket engineering is needed: use two sizes of square brass tube to fabricate a removable control-horn assembly. The inner square tubes are fixed to the elevator halves, and the outer square center tube is soldered to an arm to form the internal control horn.

You can attach the stabilizers at the field by simply inserting the wires into the fuselage and sliding the stab halves onto them. If this is the first time you've mounted stabs this way, you may not think that the mount is secure enough, but that's the way stabs are mounted on $900 molded sailplanes. I rub a little bee's wax (sold at sewing stores) on the joiner wires to provide a little more friction, and I check their position after each flight. The belt-and-suspenders types among us may want to add wheel collars or similar positive locking parts in the stabs to clamp onto the joiner wires.

On model designs with one-piece horizontal stabilizers, which are designed for the stab to be glued to a "shelf" on the fuselage, the engineering is even easier: just bolt the stab on instead of gluing it on. Small bolts can be installed from the top, as on the Dave's Aircraft Works Schweizer 1-26 shown in the photos. In this case, the vertical fin is glued to the fuselage, as originally designed.

If you want a removable fin as well, bolt from the bottom. On my Bob Martin Coyote, hex-head bolts are installed vertically from under the fuselage horizontal stab "shelf." The bolts pass through the horizontal stab and into blind nuts in the base of the vertical fin. Blind nuts (AKA "T-nuts") are the key to these installations, and they are installed on the back side of a small plywood plate glued either to the "shelf" on the fuselage or the bottom of the removable fin.

There you have it, travelers. With a small investment in materials, some time and careful work, aftermarket engineering can get your finished plane back into its original shipping box. This effort pays off by reducing your shipping costs, allowing you to fit more planes inside a car for transportation and reducing the storage space needed for finished airplanes.

Dave's Aircraft Works (949) 248-2773; davesaircraftworks.com.
Vortech Models (626) 458-5578; geocities.com/vortechmodels/vortech.htm.

The Midwest Aero-Star ARF is available from Hobby Shops and direct from Falcon Trading. Falcon Trading is a distributor of high-quality model aircraft and field accessories. Falcon was formed by a group of model airplane enthusiasts and one of the founders of Midwest Products, whose concept was to offer higher quality, better built ARF airplanes. This is our first Midwest design available as an ARF. Trade inquiries welcome.

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IMAC Aerobatics

Fly the 2002 IMAC basic sequence

by Dan Wolanski

Every year, the International Miniature Aerobatic Club (IMAC) releases new maneuver sequences for each of its classes. This year, IMAC added a fourth Intermediate class between Sportsman and Advanced to provide a natural progression through the classes. This has simplified the Basic sequence of maneuvers to attract more newcomers. The sequence can be flown with any size or type of aircraft, and that means anyone who has a plane capable of performing simple aerobatic maneuvers can compete in an IMAC event. A scale-type aircraft is not required until competitors reach the Sportsman class.

HOW TO FLY THE 2002 BASIC SEQUENCE

Here are some insights and tips on how to fly the sequence. To start, fly your plane into the wind, its wings level, approximately 100 feet high and about 100 yards away from you. Call the box to the judges by saying, "In the box!" (See the February 2002 issue of *Model Airplane News* for a schematic of the aerobatic box.)

The maneuvers shown on the left of the diagram should be flown approximately 600 feet left of center; the maneuvers on the right should be flown 600 feet to the right of center. The center maneuvers must be centered, or they'll be downgraded. I recommend that you use a minimum 100-foot altitude for all maneuvers and a 500-foot ceiling. This will allow for recovery in the event of any errors.

1. Loop. Fly to the exact center of the box and advance the throttle to full; begin to execute a loop with a diameter of 150 to 200 feet. Keep in mind that once you make the initial pull, you must use the same radius throughout the maneuver to keep it symmetrical. Gently pull through the first part of the loop and throttle back at the top. Coast through the back of the loop at idle and advance to ½ throttle as you exit the loop. It should end at the same place as you started it. Now keep your throttle at about ½; this will allow you time to think and set up for the next maneuver.

2. Humpty Bump ½ roll down. Begin this maneuver 500 to 600 feet from the center of the box. Pull a gentle radius up, climb vertically about 500 feet correcting the vertical line with rudder as the plane travels upward. When you reach the top, execute a ½ loop, reducing throttle to idle at the top of the loop. The radius of the loop does not have to match the previous radius. Travel straight down 200 feet and perform a ½ roll. Travel another 200 feet down and exit the maneuver using the same radius as you entered. You do not have to enter and exit the maneuver at the same altitude. Now advance to ½ throttle and fly to the other end of the box.

3. Hammerhead (also called a stall turn). Fly through the center of the box to

2002 IMAC BASIC SEQUENCE

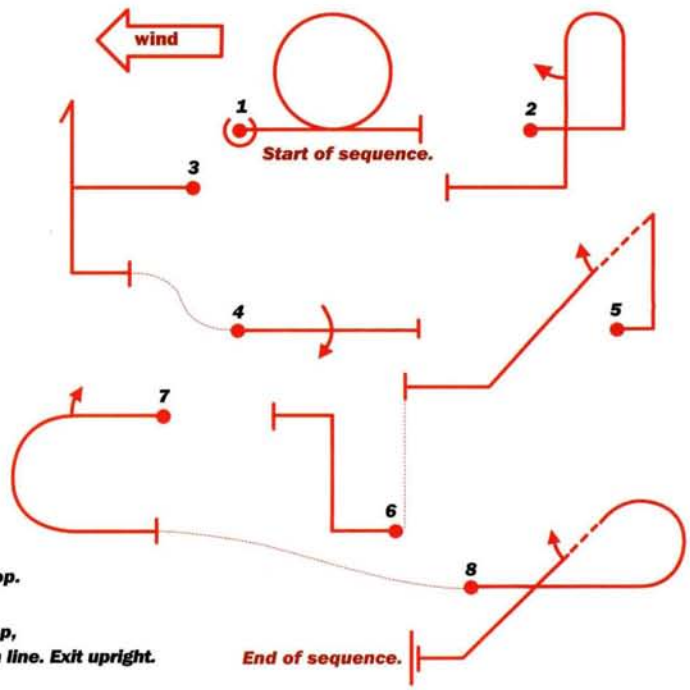
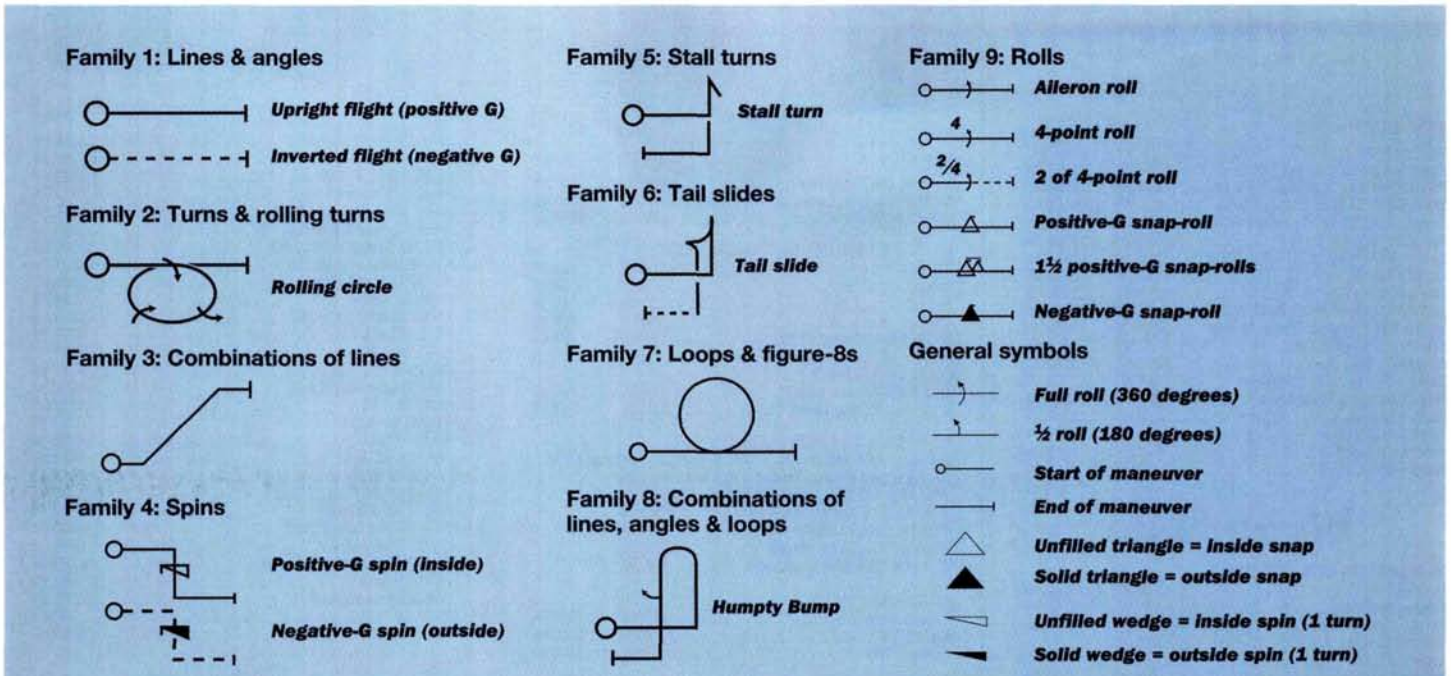


Figure	Description
1	*Inside loop*
2	*Humpty Bump: vertical up line, ½ inside loop over the top, ½ roll on vertical down line. Exit upright.*
3	*Hammerhead or stall turn; exit upright.*
4	*1 full roll*
5	*Shark's tooth: vertical up line, ½ roll on inverted 45-degree down line. Exit upright.*
6	*Vertical up line; exit upright.*
7	*Split-S: ½ roll to inverted, ½ inside loop. Exit upright.*
8	*½ Cuban-8: ⅝ inside loop, ½ roll on 45-degree down line. Exit upright.*



ARESTI DIAGRAMS—BREAKING THE CODE

In full-scale aerobatics, pilots generally draw diagrams of the maneuvers they'll perform. The sequence they're flown in is taped to the instrument panel. If you've looked into the cockpit of an aerobatic plane and have seen such a diagram, I bet you've wondered what all the lines, arrows, dashes and arches mean.

Devised in the early 60s by Jose Louis Aresti, the Aresti system of symbols has become the standard for the international aerobatic community and is still in use today. Aresti symbols are an easy way for pilots to communicate their maneuvers to one another and for judges to keep track of aerobatic maneuvers. RC pilots also use Aresti symbols to track their maneuvers in IMAC events.

The system consists of 14 "families" of figures, and within each family are many variations. For example, family 1 comprises lines and angles—as many as 68 types. Family 2 includes 60 variations of turns and rolling turns, and so on. Altogether, 834 basic figures can be combined to create thousands of maneuvers and sequences. Also, each figure has a small circle to show the start and a small vertical line to indicate the end of the maneuver. Shown above are the basic figures that maneuvers comprise, and there's a description of what the figure represents.

the end. When the plane is 600 feet past center, with the wings level, pull vertical using a gentle radius. Climb 400 feet, then reduce the throttle while still pointing straight up; the plane will begin to rapidly slow down. Once it has stopped completely, apply full rudder and blip the throttle. This will provide airflow over the rudder to help the plane rotate. Once it starts to rotate, slowly remove the rudder input and coast down about 150 feet. Pull out of the maneuver using the radius at which you entered the maneuver, and advance the throttle to ½. This maneuver does not require you to enter and exit at the same altitude.

4. **Roll.** Just before you approach the center of the box, apply aileron to start rolling, and use ½ to ¾ throttle. Feed in down-elevator during the inverted part of the roll to avoid losing altitude. The speed or duration of the roll is not important; centering the roll in the box is. The airplane should be inverted during the roll as it passes the centerline. Also, there should be no change in altitude or heading.

5. Shark's tooth ½ roll up. At the end of the box, advance to full throttle and pull vertical. Once you reach an altitude of 500 feet, pull up-elevator until you achieve an inverted 45-degree down line, and reduce the throttle to idle, or slightly above. Hold the inverted down line for a few hundred feet and then perform a ½ roll to upright. Hold the upright line for the same distance as the inverted section. Return to level flight using the same radius as when you entered the maneuver. This maneuver does not have to be exited at the same altitude as you entered.

6. Vertical up line. This maneuver starts fairly quickly after the shark's tooth, so be prepared. At the center of the box, go to full throttle and pull your plane vertical while you remain on the centerline. To track the plane straight up the centerline, use whichever correction is necessary to counter the wind. Once you have reached 500 feet of altitude, push to level flight using the same radius as when you entered. Reduce throttle to ½ or less.

7. Split-S. As you reach the end of the box, reduce the throttle to idle and immediately perform a ½ roll to inverted flight; the plane's nose will drop slightly. Apply up-elevator and perform a constant-radius ½ loop to upright flight.

8. Half Cuban-8. Approach the edge of the box, pull back on the elevator stick, and perform ⅝ of an inside loop. As you approach the ⅝ mark, reduce throttle and begin to feed in down-elevator to establish an inverted 45-degree down line. Continue inverted and do a ½ roll to upright; pull out with the wings level and with the same radius as you entered the maneuver. Center the roll in the inverted down line. Rock the wings and call, "Out of the box." Congratulations! You have just completed the 2002 IMAC Basic sequence.

To learn more about IMAC and to join, contact IMAC Secretary Steve Evans, 217 Southpoint Dr., Avon Lake, OH 44012-1958; or visit mini-iac.com. See you at the practice field!

FUTABA 9CAP

Feature-packed and perfectly priced

by Bob Aberle

The Futaba 9C series is a very interesting new addition to the Futaba line of radios. The radios are very sophisticated and have a lot of new features but are still surprisingly affordable. The best thing about them is how easy they are to use.

The new Futaba 9C Series is perfect for fliers at every level—from sport fliers to experts. It offers many great features at an affordable price.

The 9C is available in PCM and PPM (standard FM) versions for powered airplanes, sailplanes and helicopters. The PCM systems come with a 9-channel R149DP receiver, and the PPM systems are supplied with 8-channel R148DF receivers. In addition to the standard package, helicopter versions of the 9C come with an extra servo and a larger-capacity airborne battery pack (1000mAh).

The 9C series is available on all the 72MHz and the 50MHz (6-meter) RC channels, and the removable RF module makes it easy to change the frequency. Eight model-memory positions are a standard feature. With an optional $79.99 CAMPac module installed at the top front of the case just below the antenna mast, you can increase the memory up to 14 models. Each model-memory position can be named, and that name always appears on the start-up display. You can also copy control-input data from one memory position to another. The FM mode uses negative-shift deviation.

In this review, I'll discuss the specific features of the 9CAP system. It comes with a 9-channel PCM receiver that has a fail-safe feature. The transmitter is much easier to operate than it first appears. I'm sure the average modeler will have no problem operating this system.

BASIC DISPLAY

When the power is turned on, the large (2½x1¼ inches) LCD screen displays the memory position number, the model name, whether you're transmitting on PCM or PPM, transmitter voltage, three timer readouts (count up, count down and elapsed time) and a graphics display of the four trim positions (aileron, elevator, rudder and throttle).

These digital trim indications are well thought out. As you introduce trim, you'll hear a beep, and at the same time, the bar graph will move up or down. When you reach maximum trim, you will hear a long, loud beep. If you return to neutral, you'll hear a short beep at exact center trim. Also, the 9CAP's low-battery alarm will sound when the voltage drops to 8.5. These audible cues let you keep your eyes on your model while it's in flight.

In addition, the digital trim and sub-trim functions make it easy to save the trim positions and neutralize the trim locations. This is especially helpful when you switch models and need to use a different memory position.

BASIC MENU

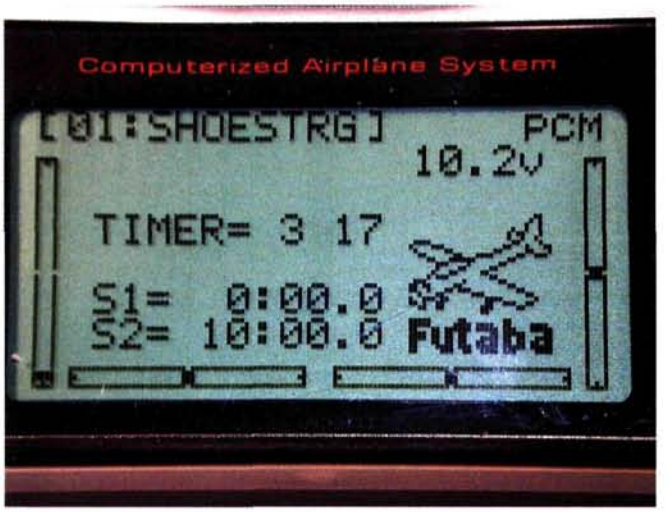
Press the "Mode" key for one second to display the basic menu ("Basic Acro," "Basic Heli," or "Basic Glid," depending on what you chose). There are two screen pages for the basic menu, and one page scrolls into the other. This menu includes: the model name, dual rates, exponential rates, end-point adjustments, sub-trim, trim, throttle cut, idle down, fail-safe (only for PCM operation), auxiliary-channel assignment, parameter (where you choose fixed-wing, glider, or helicopter), timer choices, trainer function and servo test functions.

Use the small rotary dial on the lower right hand-front panel to scroll through the choices; Futaba calls this a "Dial 'n Key" system. Rotate the dial in either direction to move up or down, and press on the dial to select the highlighted item. In a sense, the dial acts very much like a mouse on a computer.

Once you've selected an item, press "Select" and rotate the dial to the control settings you want. The individual displays are excellent, and they make it possible to work without the need to repeatedly reference the instruction manual. Press "End" at any time and the screen will revert back to the basic menu; press it again and the screen will return to the basic display.

ADVANCED MENU

From the basic display, press "Mode" and hold it for one second to get to the basic menu. When you press "Mode" a second time and hold it for second, the advanced menu will appear. It contains seven



This "basic display" appears when the transmitter is turned on. The model memory position number and model name are at the top left and center. The PCM choice appears at the top right. The number 10.2 indicates the transmitter voltage. "Timer" is the elapsed time that the power has been on and S1 and S2 are the timer count-up and -down functions. The four bars around the screen show the trim positions for the four basic controls (aileron, elevator, rudder and throttle). In this photo, all are in their center position.

programmable mixes and flaperons, flap-trim, aileron differential, air brake, elevator/flap control, V-tail, elevons, ailevator, snap-roll functions, throttle-trim delay and throttle needle mixing.

I'm sure someone is wondering what an "ailevator" function is. Well, it is when twin elevator servos are plugged into separate channels and then are used to control elevators with the option of also acting as ailerons in conjunction with the primary aileron control. This might prove useful on some of the highly maneuverable fun-fly models we're seeing now.

Certain advanced control features are set up and depend on your choice of fixed-wing aircraft, helicopter, or sailplanes. Check out the Futaba website at futaba-rc.com for more specific information regarding these.

The excellent instruction manual is printed on loose pages with holes punched for a three-ring binder. Over time, Futaba expects to publish system updates and suggestions that can either be mailed to you or downloaded from the Futaba website. Then it is simply a matter of adding or substituting pages in the manual.

AIRBORNE COMPONENTS

The type of receiver you receive depends on your system choice: the R-149DP—1024 PCM dual-conversion receiver weighing 1.22 ounce or the R148DF—PPM dual-conversion unit that weighs 1.1 ounce. It's important to note that when the voltage drops below 3.8, the PCM receiver's fail-safe will move the engine throttle to idle or any preset position you've chosen. I've flown with this particular FM receiver in the AMA Nats since 1995 and have never experienced a glitch.

The 9CAP comes with Futaba S3001 servos that weigh 1.59 ounce each and have an output of 41.7 oz.-in. Check out the Futaba catalog or the website for a complete list of servo options.

CONCLUSION

I liked everything about this new Futaba radio system. It's very easy to operate, and the instruction manual takes you from a quick startup through the most advanced control features. Even sport fliers can use the 9C basic system and only employ the specific controls they require. The other features can be easily turned off so that they are not accidentally put to use. With eight, nameable memory positions (up to 14 with the optional CAMPac), you can use this one transmitter to operate your entire model inventory. The new menu format with the "mouse-type" controller makes control input adjustments easy. Another nice feature is that this system uses a non-volatile memory, so it doesn't require an extra battery that would eventually need to be replaced. All in all, the 9C is a great system at a surprisingly affordable price. ✈

Futaba's new "Dial 'n Key" main-menu controller works very much like a computer mouse. Rotate the knob to scroll through a menu, then press it to select a particular function.

SPECIFICATIONS

MODEL: 9C Radio Series (9CAP)

MANUFACTURER: Futaba Corp. of America

DISTRIBUTOR: Great Planes Model Distributors

TRANSMITTER: 33.1 oz., 9-channel dual-stick (Mode-II); eight model-memory positions (expandable to 14 positions with an optional module); onscreen and audible low-battery warning when voltage falls below 8.5 volts; removable RF module can provide all 72 and 50MHz RC channels individually (needs separate modules), but not synthesized.

RECEIVER: R149DP, PCM 1024, 9-channel; 2.17x1.28x0.82 in.; weight: 1.22 oz.; dual-conversion circuitry.

SERVOS: Futaba S3001 standard (ball-bearing); 1.59x1.41x0.78 in.; weight: 1.59 oz.; rated output: 41.7 oz.-in.; travel time: 0.22 second for 22 degrees rotation.

ACCESSORIES: switch harness with charging jack, 4-cell, 600mAh Ni-Cd battery pack, dual-output battery charger, aileron extension cable, extra output arms, servo-mounting hardware, frequency flag and an excellent instruction manual.

WEIGHT OF AIRBORNE PACK: 11.4 oz.

STREET PRICES: 9CAP $449.99; 9CAF $379.99 (PPM system)

COMMENTS: this new radio system bridges the gap between the very popular 8U series and the top-of-the-line 9Z series. The 9CAP is a good choice for sport fliers up through experts. Everything necessary for fixed-wing, sailplane and helicopter control is available in this one package, but you may use only the controls you need.

HITS

- 8 nameable memory positions (expandable to 14 with an optional CAMPac module).
- Easy-to-follow menu system thanks to the new "Dial 'n Key" control.
- Large number of features.
- Excellent instruction manual.
- Affordable price.

MISSES

- Can't choose between negative/positive shift deviation.

PHOTOS BY BOB ABERLE

Futaba; *distributed by Great Planes Model Distributors Co. (800) 637-7660; futaba-rc.com.*

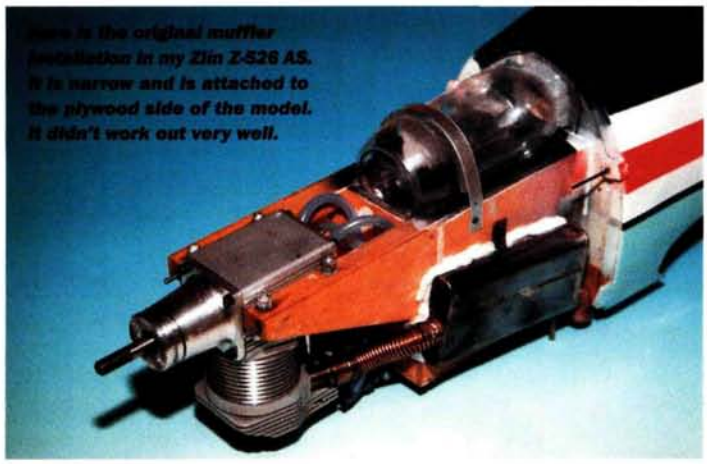
Muffler installations and engine cooling

One of the challenges of building scale models from scratch is that it is not always possible to use standard, commercially available parts. The muffler I used on my scratch-built Zlín Z-526 AS (featured in the January 2002 issue of *Model Airplane News*) was one of these challenges.

The full-size Zlín has a very slim nose section. Although aesthetically pleasing, this design provides little room for a decent muffler to quiet the engine. A friend suggested using a 6-inch length of bendable stainless-steel pipe that can be concealed just about anywhere—problem solved! Unfortunately, though, this didn't work out. Even at ½ throttle, the engine screamed like a banshee! Noise regulations are strict throughout Europe, and if I intended to fly this model without being kicked off the flying field, I had to come up with a more effective muffler.

To increase engine cooling, I installed the engine in my Hawker Fury biplane so that its cylinder head just protrudes out of the engine cowl. Hot air exits the cowl through the scale radiator between the landing-gear struts and through ducting to the open cockpit area.

My first attempt was a very flat canister muffler that just fit within the cowl. A fellow club member made it for me out of tin plate. I attached it to one of the plywood fuselage sides with a thick piece of insulating material between it and the plywood. The model was much quieter, but after a while, I noticed a strange smell coming from inside the cowl. Despite the insulation, the muffler got so hot that it burned the plywood side and melted the foam-rubber fuel-tank padding inside the fuselage. The only option now was to install a new, larger muffler in the area just behind the engine. Allowing for the size of the new muffler, I repositioned the firewall about 2 inches farther aft and made new engine bearers to support the engine. I also relocated the retract system's air tank to within the fuselage.



Here is the original muffler installation in my Zlin Z-526 AS. It is narrow and is attached to the plywood side of the model. It didn't work out very well.

This is the new muffler setup. The muffler is larger and more efficient, and overheating is not a problem.

With an engine cowl like this on my Zlin, there are plenty of openings for hot air to escape from the cowl.

Because the muffler was now behind the engine, less incoming air would be able to reach it. Overheating was now the subject to consider. I ordered a new muffler from a German manufacturer called Zimmermann that produces stainless-steel mufflers for the model-helicopter industry. The company also makes mufflers for fixed-wing models in small quantities. To prevent the muffler from vibrating loose while in flight, I bolted it to the engine with two brackets. This forms a single unit that can vibrate as a whole. Some may argue that it is preferable to attach the muffler to the firewall and make a flexible connection between the two. I've seen many of these connections come loose, however, and the single-unit method should last a lifetime. Also, because silicone fuel lines can melt if placed too close to a hot muffler, I repositioned the fuel plumbing as shown in the photo.

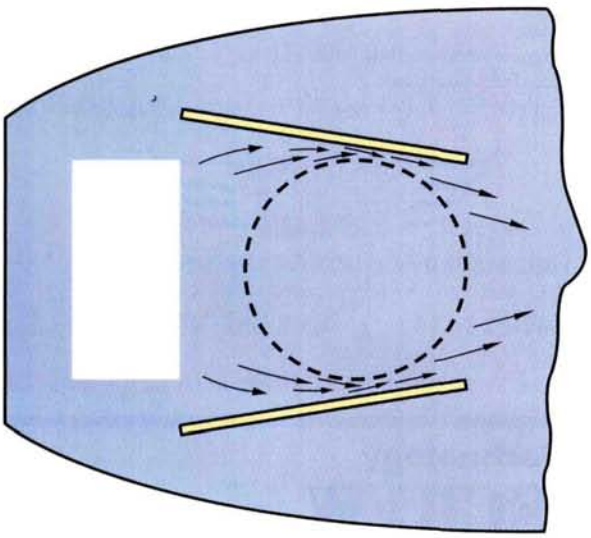
With the new muffler configuration, the difference was like night and day. The model is very quiet, and after flying it several times (often in temperatures approaching 100 degrees), I have not had a problem with it overheating. A well-ventilated engine cowl is a must for this, however.

PROPER COOLING

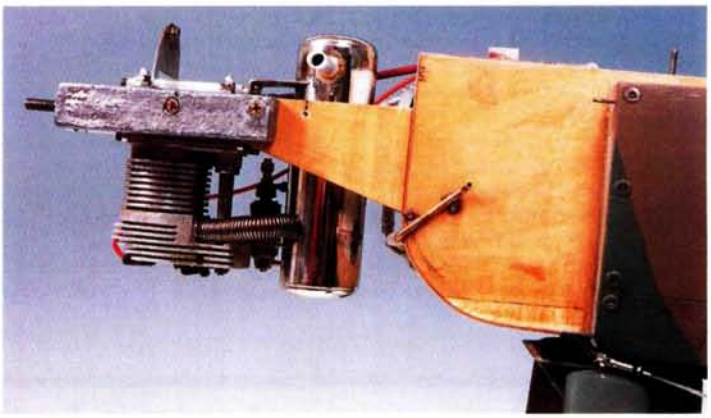
Unlike sport models, in which the focus is on engine accessibility, scale models have engines that protrude from the cowl barely, if at all. Models that feature engine cowls similar to the Zlín's seldom have overheating problems, as the full-size aircraft design provides sufficient outlets for the hot air to escape. I always try to find a balance between practicality and scale appearance, and it all depends on the specific model whether a fully enclosed engine is really necessary.

For instance, the Hawker Fury biplane has a fully enclosed engine, but on my model, I let the cylinder head protrude slightly to give maximum cooling. My Spitfire, on the other hand, has a

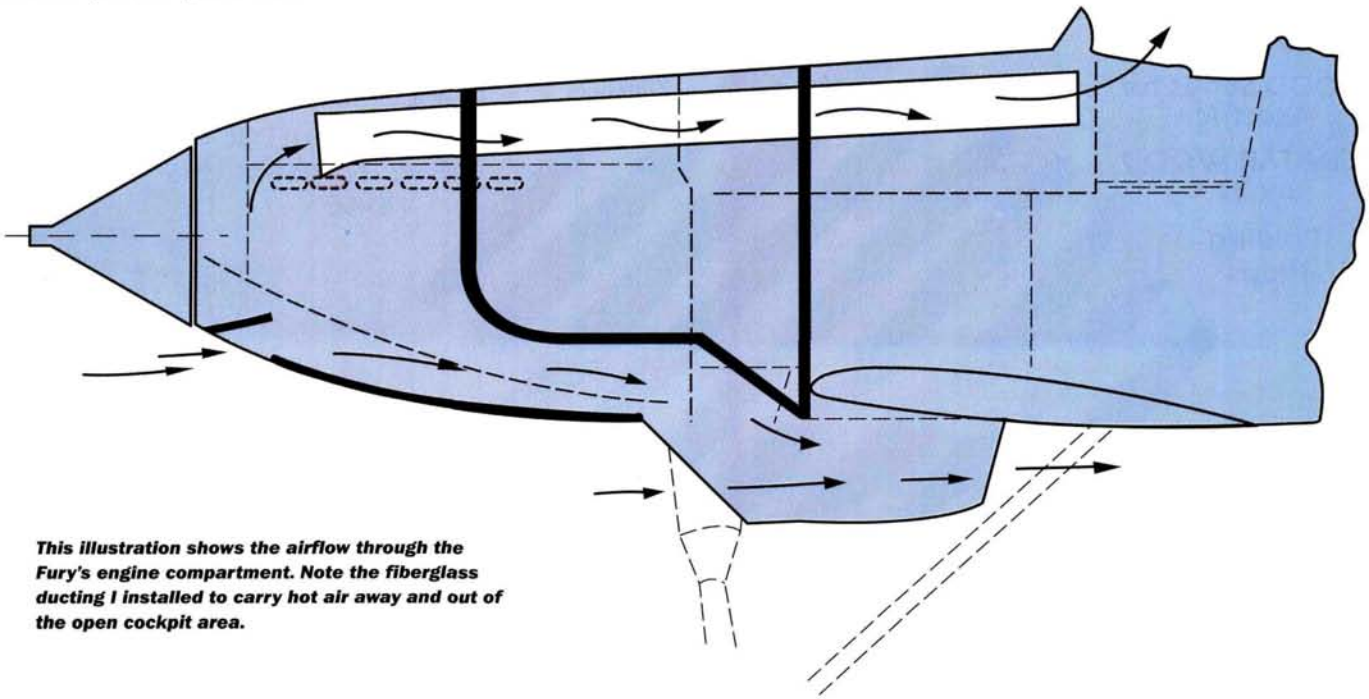
Continued on page 118



Internal baffles can also be used to channel and make the most of the air that enters the engine cowl. Angling them as shown maximizes airflow around and past the cylinder head.



Here's the engine installation for my Fury biplane. Note the rounded shape of the firewall's lower corner. This helps the air flow properly out the bottom of the cowl and into the scale radiator between the landing-gear struts.

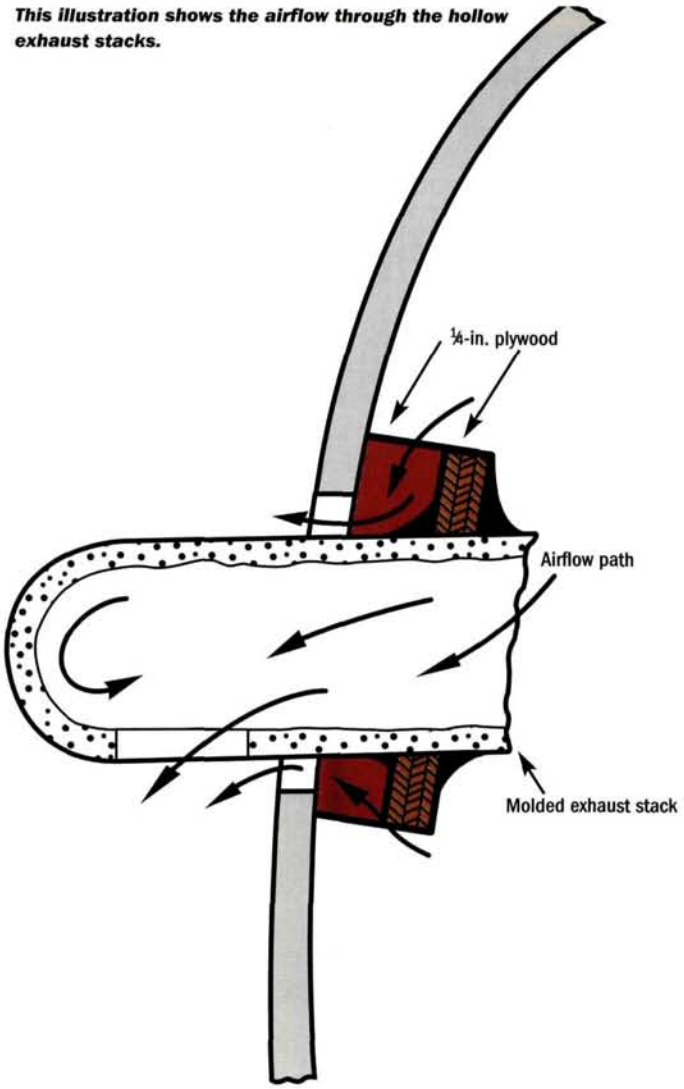


This illustration shows the airflow through the Fury's engine compartment. Note the fiberglass ducting I installed to carry hot air away and out of the open cockpit area.

Continued from page 114

These exhaust stacks are molded of fiberglass and were drilled out to allow air to escape from the engine compartment. Though very scale in appearance, this Spitfire has never had an engine-overheating problem.

This illustration shows the airflow through the hollow exhaust stacks.



small vent hatch in the front of its cowl that I push inward before flight. To allow sufficient air to reach the engine's cylinder and to make the most of that airflow, I placed a baffle plate on each side of the cylinder. These plates form a slight taper, and this produces a venturi effect that reduces air pressure around the cylinder. The reduced pressure enhances airflow past the cylinder.

When I built my Dennis Bryant-designed Hawker Fury biplane, I did not intend it to be a precision scale competition model. Engine reliability was a more important factor than scale outline. So even though it was possible to fully enclose its engine, I installed it so that it protruded slightly from the front of the cowl. I formed a radius at the lower end of the firewall that enhances airflow and reduces vortices within the cowl, thus making it easier for the hot air to escape. I cut a square opening in the underside of the cowl to allow the hot air to exit into the scale radiator. There it is carried away by the airflow through the radiator during flight. To allow as much airflow as possible through the radiator, I didn't install any wire mesh in its front.

This removable hatch from the Hawker Fury shows a section of the ducting that channels air to the open cockpit.

To remove hot air from the unoccupied area above the engine in the cowl, I installed a fiberglass duct to direct it out of the cowl and carry it to the open cockpit where it exits the model. Further cooling is achieved via airflow through the open, scale exhaust ports cut into the sides of the cowl.

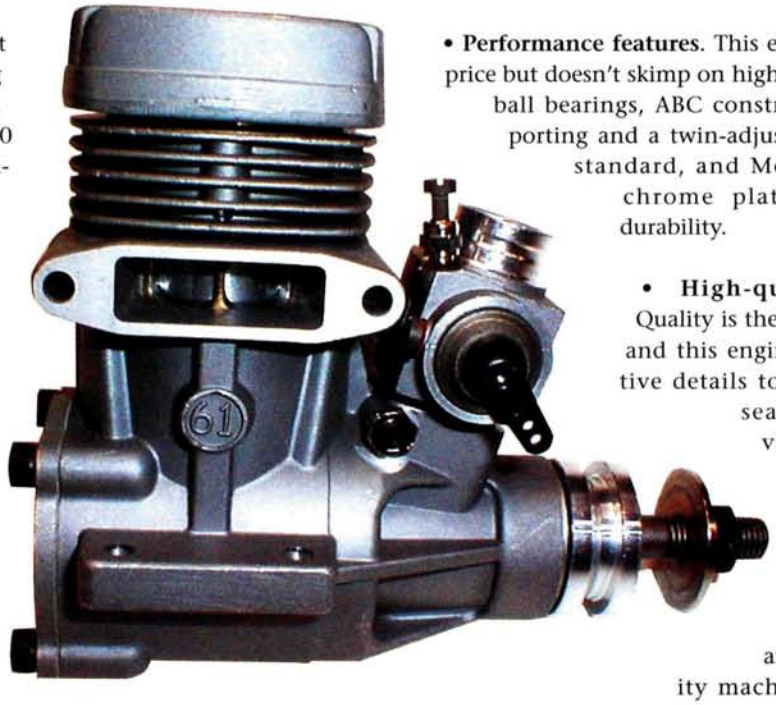
On my Brian Taylor Spitfire, I used a variation of this method. As well as using internal baffles to direct the airflow around the cylinder head, I molded scale exhaust stacks from fiberglass and drilled them out. I then glued these to vertical plywood plates that I attached to the inside of the cowl (see illustration). This formed a gap above and below the exhaust stack and allows airflow through and around them. I also connected the muffler to one of the stacks, and this directs the exhaust gases out of the cowl. The result is a very scale-appearing model that has flown in very hot weather and has never suffered from overheating.

Always remember: proper engine cooling requires allowing air into the cowl and then giving it a way to exit. That's it for this month; next time, we'll talk about scale painting and masking. Until then, have fun!

Zimmermann Schalldämpfersysteme, *Köhlter Holz 47, 32479 Hille-Unterlübbe, Germany.*

Megatech M-61

For the average RC'er, the three most important criteria in determining engine quality are ease of operation, performance and value. With more than 40 years' experience in the hobby as a competitor, sport enthusiast and instructor, I've seen engine manufacturers try just about everything to incorporate these virtues and create a successful design. Megatech's formula starts with a durable foundation and then adds convenience and performance features while keeping a firm lid on price. At $99.95, it would be tough to find another 60-size engine that can match the M-61's impressive list of standard equipment. On paper, the M-61 looks like a real winner; let's take a look at how it actually performs.



I like the robust overall construction of the M-61, including the mounting-lug and exhaust-port/muffler-mount thickness, the hefty 5/16-inch prop shaft and the large cooling-fin area.

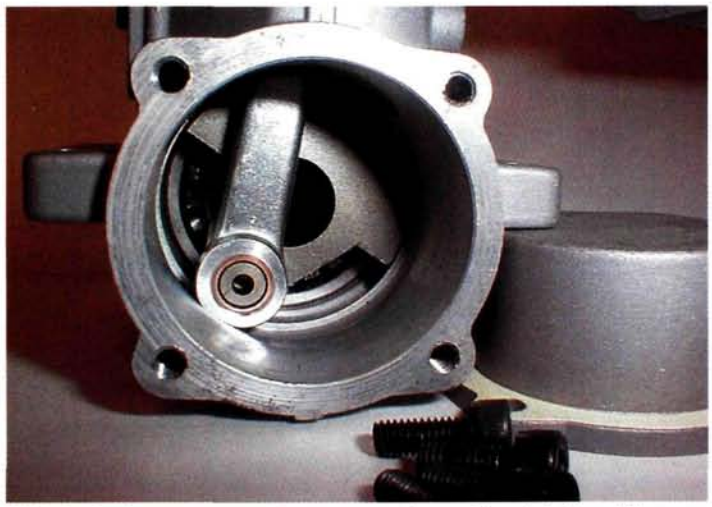
FEATURES

The M-61 is the largest displacement engine in Megatech's "M" series, which also includes .15, .28, .37, .40 and .46 engines. All have the desirable performance features of ABC piston/cylinder construction, twin ball bearings and a twin-adjustment carb, and all come with a factory muffler. The M-61's construction is quite heavy-duty, and with its 5/16-inch-diameter crankshaft, it should be relatively crash-resistant. As a result, the M-61 weighs slightly more than the competition. At 28.2 ounces with the muffler, it's about 1.4 ounces heavier than the similarly constructed Thunder Tiger Pro .61, which is typical of the class.

• **Performance features.** This engine has a budget price but doesn't skimp on high-end features. Twin ball bearings, ABC construction, Schnuerle porting and a twin-adjustment carb are all standard, and Megatech uses true chrome plating to enhance durability.

• **High-quality features.** Quality is the sum of the details, and this engine has many positive details to mention: O-ring seals on the needle valve and in the carb, the squared head and cylinder fin shape (that adds to the cooling-fin area) and high-quality machining throughout are just a few. I removed the rear cover to peek inside the crankcase and found it spotless—clean and chip free with bright and smooth machined surfaces.

• **Convenience features.** Simplicity and versatility are the keys to convenience. The M-61 allows you to easily add a needle extension; that's important for planes with cowls. The exhaust outlet on the muffler rotates to adapt to various cowl and mounting configurations. I like the drawbar-type carb retainer; it's very secure but the carb can still be easily removed for maintenance. Also, both carb-mixture adjustments are conveniently placed on



With the back cover removed, you can see the spotless interior of the crankcase with its bright, smooth machining—definitely high-quality workmanship.

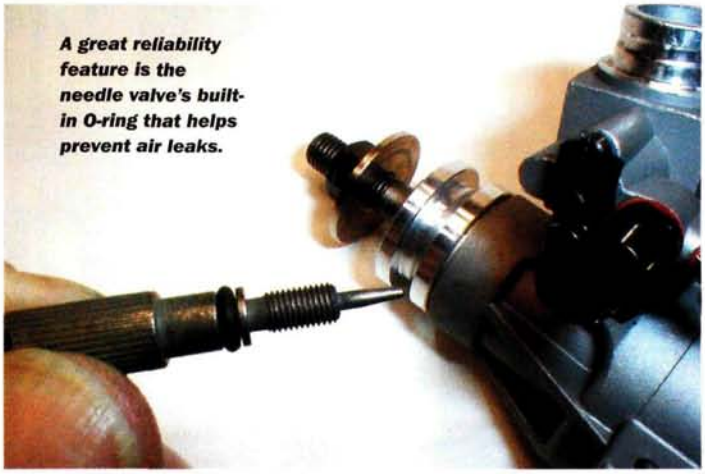
SPECIFICATIONS

ENGINE: Megatech M-61
DISTRIBUTOR: Megatech
WARRANTY: 2 years
DISPLACEMENT: 0.61ci (9.97cc)
BORE: 0.91 in. (23mm)
STROKE: 0.94 in. (24mm)
LISTED OUTPUT: 1.85hp @16,000rpm
PRACTICAL RPM RANGE: 2,000 to 16,000rpm
WEIGHT: 20.6 oz. (without muffler); 28.2 oz. (with muffler)
WIDTH: 2.375 in.
LENGTH: 3.75 in.
SHAFT DIAMETER: 5/16 in. (8mm)
PRICE: $99.95

HITS
- Low price.
- Rugged construction.
- Loaded with features.
- Good power.

MISSES
- Slightly heavy by .60 standards.
- Lean midrange.

The carb full-metering tube has a metering slot (near left end in photo) and O-rings.



A great reliability feature is the needle valve's built-in O-ring that helps prevent air leaks.

the same side, and a dedicated retainer screw holds the carb barrel. This makes the idle-speed screw optional; it can be removed. I never use the idle-speed screw; I either remove it or back it way off so that it can't possibly stall the throttle servo.

PROP PERFORMANCE

PROP	MAX. RPM	BEST IDLE
APC 12x6	12,400	2,300
Master Airscrew 12x6	12,600	2,300
APC 11x8	12,400	2,400
Zinger 11x8	12,300	2,800
APC 11x7	13,300	2,300

All tests were performed without the muffler baffle, using Cool Power 15-percent nitro/all-synthetic-oil fuel and an O.S. no. 8 glow plug.

Above: the two-piece muffler is held together by a traditional through-bolt and nut. It comes with a convenient, removable baffle, although I did not use it in my testing. The engine-to-muffler bolts are hardened (as are all the other bolts), but I like to replace them with soft-steel or brass hardware-store-quality bolts so that in a crash they will shear off first and possibly leave the engine undamaged. Right: the provided boss for an optional pressure fitting is convenient if a fuel pump or smoke system is ever installed in the model.

This lets me set the carb barrel and throttle servo so I can kill the engine from the transmitter.

Another nice feature is the removable muffler baffle. With the muffler's split housing design, it takes only a minute to remove or reinstall the baffle. The baffle reduces power somewhat, but it also reduces noise; you can decide to use it or not depending on local noise restrictions. I didn't receive the baffle with my test engine, so I can't make a direct comparison.

The engine's rear cover has a cast-in boss to permit the installation of a crankcase pressure fitting; this is a great feature if you ever want to install a pressure-driven fuel pump or smoke pump. These little convenience items may seem trivial individually, but believe me, you'll appreciate the additional versatility they offer for installation and operation.

PERFORMANCE

The final version of the owner's manual wasn't available at the time of my test runs, so I followed a standard, although abbreviated, break-in procedure for ABC engines: use fuel containing some castor and avoid rich, 4-cycle needle settings for the first few tanks; that's it! I used a test stand, but this engine didn't seem to need any break-in at all. It performed well from the first start; I could have flown it "right out of the box" (as they say) with a slightly rich needle setting. Starts were easy, but I always use an electric starter for extra safety. Power and throttling were generally excellent, with good idle and a smooth, quick transition to wide-open.

I should note that the midrange rpm (7,000 to 9,000) was

slightly lean. The carb on the M-61 doesn't have a separate midrange mixture adjustment, so it relies on the shape of the internal fuel-metering slot to provide the correct fuel mixture during part-throttle operation. To compensate for the lean midrange, I set the high-end and idle slightly rich. Although this problem won't prevent a plane from flying successfully, it isn't ideal. I asked Megatech about it and was told that I had been sent an early production version and that it is looking into revising the fuel-metering slot for later production pieces.

As you review the prop performance chart, note that the Zinger prop (the only wooden prop tested) doesn't idle as slowly as a same-size composite prop. This is because the extra weight of the composite prop provides a flywheel effect. The wooden prop, however, has faster throttle response and gives faster acceleration. I ran low-nitro fuels—even "0" percent—and found that the engine isn't fussy at all. Of course, you should always readjust the carb when you switch fuel type. No glow plug was provided, but any included plug would most likely be replaced by the owner's favorite plug anyway, so this is no big deal.

CONCLUSION

I like the user-friendly nature and overall value of the M-61 along with its many design, performance and convenience features. The midrange lean condition is of some concern, but it isn't severe enough to cause problems, and Megatech said it will be addressed in later production engines. The M-61 is slightly heavier than many of its contemporaries, but the extra weight is the tradeoff for the design's superior ruggedness and durability. All things considered, the value here is outstanding. At only $99.95, including the muffler, I don't think you'll find more engine for the dollar anywhere.

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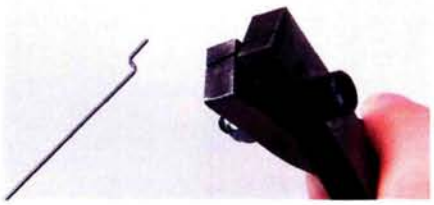
AT *MODEL AIRPLANE NEWS*, we not only tell you what's new, but we also try it out first so we can bring you mini-reviews of the stuff we like best. We're constantly being sent the latest support equipment manufacturers have to offer. If we think a product is good—something special that will make your modeling experiences a little easier or just plain more fun—we'll let you know here. From retracts and hinges to glow starters and videotapes, look for it in "Product Watch."

Radical RC

Z-bend Pliers

Control rods made "easy"

Chances are, the instructions for several of the planes in your hangar asked you to make Z-bends in the pushrods; and chances are, you made them the old-fashioned way—by hand. If you're lucky you used a Z-bend tool; such a tool saves time, but most produce angles that aren't very precise. Well, if you had had a pair of Radical RC's Z-bend pliers, you could have made enough bends for a 6-channel model during the time it took you to read this far, and each bend would be perfectly square. No kidding! These things couldn't be easier to use, and the angles come out just right every time.



The design uses a scissors motion rather than the clamping motion used by other similar products. The result is a more efficient use of leverage; full 90-degree bends can be made with a light squeeze of the handles. The scissors motion automatically stops its travel when the bends reach 90 degrees, so the angles are always square.

First, mark the place on the rod where you want the bend (remember to zero your servo before you start). Next, align the pliers' jaws so the slots line up, and insert the rod into the slots with the bend mark between the jaws. Then close the jaws, and—just like that—you have a perfect Z-bend. If there's one part of the process that's even slightly difficult, it is removing the bent rod from the jaws' slots. Depending on the control rod's diameter, you may have to tug on it a little to remove it from the pliers. Next, install the rod in your airplane, and make your final adjustments to the other end. Through one arm of the pliers, there's a hole that serves as a rod cutter. Simply thread your wire through the hole; the part that extends out of the hole on the inside of the pliers' arm will be cleanly clipped off when you close the pliers.

I used 1/32-inch Z-bend pliers on relatively thin rods for a park flyer, and they worked flawlessly. Radical RC also sells versions to fit 2-56 and 4-40 wire and a combo pliers that fits both larger sizes. Regardless of the size of your plane, they are great time-savers.

The Z-bend pliers are very affordable at $15 ($16 for the combo size), and it's hard to argue with the convenience they provide.

—Matt Boyd

Radical RC (937) 237-7889; radicalrc.com.

Schulze

Chamäleon isl 6-330d

High-end charging for the rest of us

How would you like to charge a pack of up to 30 Ni-Cd cells automatically? How about being able to discharge, test and cycle that pack up to three times while charging a receiver pack? Now add sensitive peak detection for NiMH packs and the ability to charge lithium-ion and lithium-metal (Tadiran/Duralite) packs for slow flyers and receivers—all in one charger. Until recently, such a unit would have cost several hundred dollars.

Schulze is well known for its world-class chargers, and its new, "low-end" charger, the isl 6-330d, has all of these features in a package that's smaller and less expensive than any of Shulze's others.

How did Schulze put all these capabilities into a unit that costs half as much as the next more expensive model in its line? For one thing, the 6-330d charges a maximum of 30 cells instead of the 36 cells that Schulze's most expensive charger services—and at a maximum of 5.6 amps and not 8 to 12. The discharge rates are also lower, and the second output is limited to a 330mA charge rate, which is still just fine for receiver batteries. Also, the large, two-line display has been replaced by a smaller, single-line display on which lines of information alternate. Even so, this is a remarkably capable charger and discharger.

Physically, it is a solidly built, 1½-inch-thick metal package that measures 5½x6 inches, including a large heat sink at the top. The heavy-gauge input lead is more than 5 feet long and is equipped with alligator clamps of ample size. The two outputs have banana jacks; you have to provide the output leads. Centered between the output jacks are two program-selection buttons; they also take care of other functions such as selecting a fixed charge and peak-detection sensitivity.

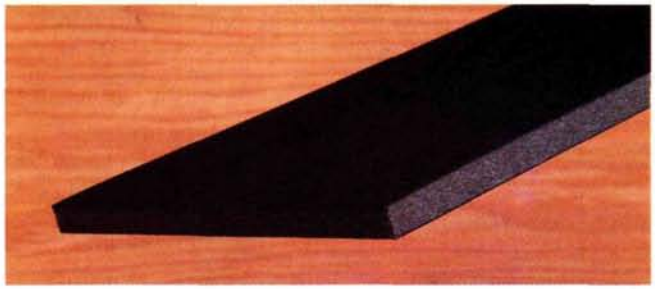
I've been flying electric models for a long time, and the little Schulze is now my favorite charger for several reasons. I use sub-C batteries—Ni-Cd and NiMH and smaller Ni-Cd cells down to 350mAh; using the Schulze charger is as easy as connecting it to the power supply or source battery and then connecting the battery to be charged. The isl 6-330d takes it from there; it tests the battery and then starts to charge it at a modest 0.3A rate. It increases this rate to suit a battery's condition (up to a maximum of 5.6 amps) and then decreases it on Ni-Cds as the pack approaches a full charge.

I've often used the "3dc" program, which discharges and then charges a pack three times in succession to "wake up" new packs and those that have sat unused for a long time. I can put a pack that needs to be cycled on it and then go to bed. In the morning, the battery has been cycled three times and is ready to go. I also use the second output to recharge my Multiplex transmitter battery (6 cells) and receiver batteries.

I've only just begun to discover what this charger can do. After 20 years of electric flight, the isl 6-330d is my favorite, and I strongly recommend it. It is currently available from R/C Direct for $189.95.

—Bernard Cawley Jr.

R/C Direct (858) 277-4531; rc-direct.com.



Retrop Industries

The Original Porta-Board

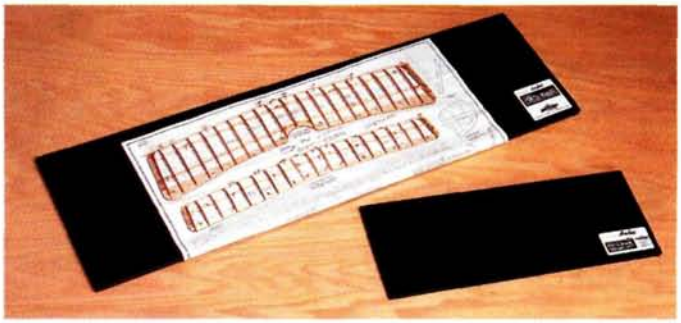
The perfect workbench accessory

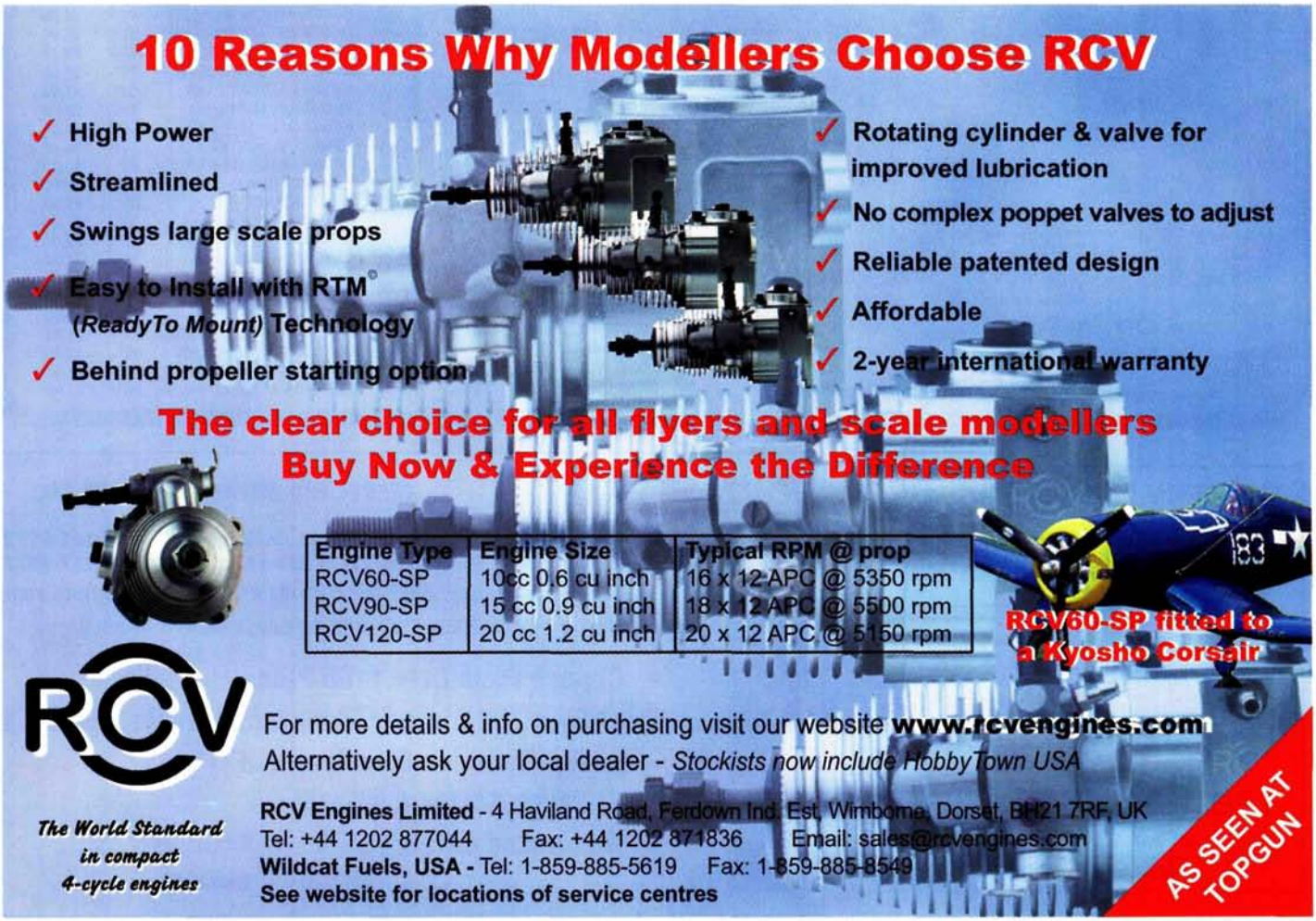
If you build your models from kits, you know the importance of having a smooth, flat building board to produce warp-free flying surfaces and structures. The versatile Porta-Board will help you make that warp-free wing. It's a rigid polystyrene foam-core that's permanently bonded on both sides to a very smooth, clay-based-composite paper. Because of the way the layers are bonded, the board is strong and resists being bent.

In my office, I have a table that I use for various projects, but it isn't suitable for sticking pins into. I decided to build a stick-and-tissue model during my lunch breaks, and I put the Porta-Board to the test. It did make building much easier; it readily accepts pins yet holds them firmly. I was able to pin all of the parts into place and make all the necessary adjustments before applying a single drop of glue. And the board is impervious to glues. As an experiment, I put a couple of drops of thin CA onto it, and it did not soak in; it just sat there. Then I sprayed the CA with kicker, and when it had set, I used a razor blade to remove the blob without damaging the board's surface. To store the board, just stand it against a wall and out of your way.

The standard Porta-Board measures 12x42 inches and costs $19.95. If you build smaller models, you might need the 8x22-inch version for $11.95. Custom sizes to suit your needs are also an option; just call for details. *—Rick Bell*

Retrop Industries (419) 468-6773.





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Jim Gillie of Coraopolis, PA, correctly identified June's mystery plane to be the Douglas O-46A. Congratulations, Jim. The O-46A followed its predecessor, the O-43A, into production for the Army and Air National Guard, and in 1936, 90 of them were delivered. Like the O-43A, the O-46A was a parasol-wing, two-seat monoplane with single-leg-type cantilever landing gear. Powered by a 725hp Pratt & Whitney R-1535-7 Twin Wasp Junior engine driving a Hamilton-Standard controllable-pitch prop, the O-46A had a 45-foot, 9-inch wingspan and could reach a maximum speed of 200mph. Its armament included one forward-firing and one rear-mounted 0.30-inch Browning. Last in a long line of Douglas observation planes, the O-46A was designed to operate from established airfields behind fairly static battle lines. It proved to be too slow to outrun and outmaneuver enemy pursuit planes, too heavy to operate from small, wet, unprepared fields and too large to conceal beneath trees. After being declared obsolete in late 1942, it was used only in training and utility roles.

The winner will be chosen, four weeks following publication, from correct answers received (delivered by U.S. mail) and will be awarded a free, one-year subscription to *Model Airplane News*. If already a subscriber, the winner will be given a free, one-year subscription extension.

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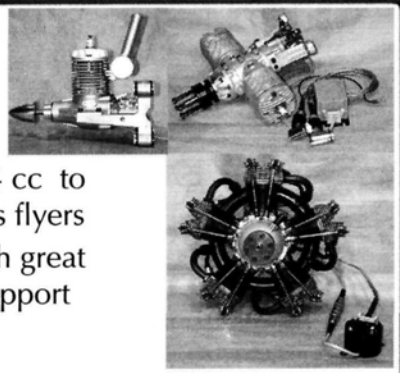

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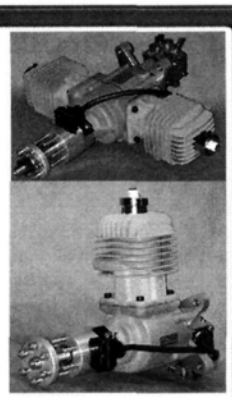

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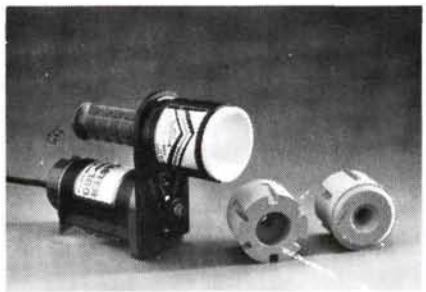

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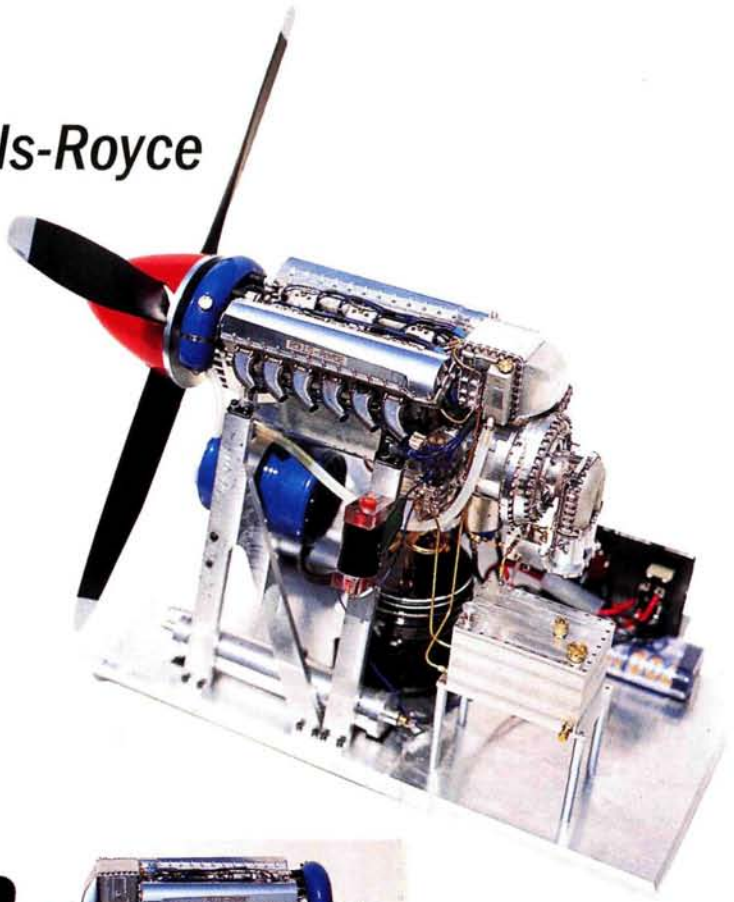
BY FRANK GUDAITIS

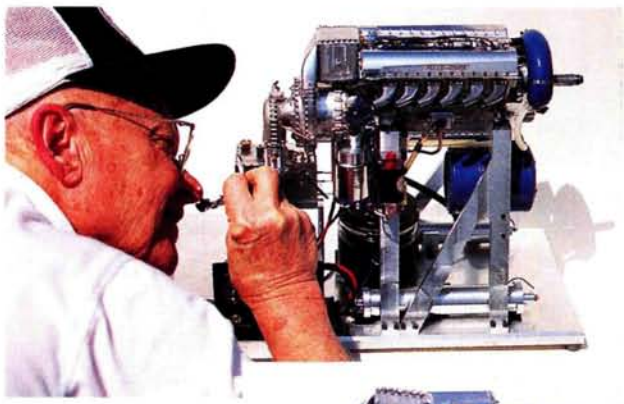
One-of-a-kind, ⅛-scale Rolls-Royce

This ⅛-scale, working, Rolls-Royce Merlin engine is the result of nearly 10 years of painstaking work and more than three years spent at the drawing board. It's the first in a line of miniature working aircraft engines that engineer and designer Dick Yeagley intends to build. Fascinated by the huge V-12, Dick started with what he believed to be the most difficult to design and build; he's hoping things will get easier from here.



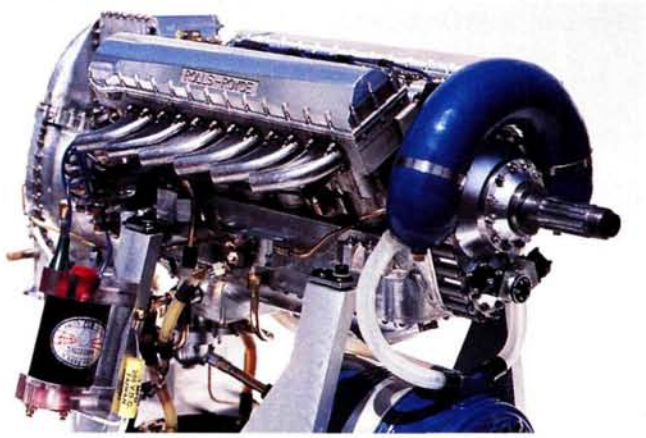
Because he did not have factory blueprints from Rolls-Royce, Dick got the detailed information he needed from the Experimental Aircraft Association, the Smithsonian Air Museum and the Stallion 51 group, which services and restores full-size Merlin engines.

Dick modeled his miniature after the Merlin engines that were built in the U.S. by the Packard Motor Co. The overall length of this wet-sleeve-type engine is 11½ inches; the actual length of each 6-cylinder engine bank is less than 5 inches! The bore of each cylinder is 0.6875 inch, the stroke is 0.764 inch, and it has a displacement of 3.4ci. There are four valves per cylinder operated by a single overhead cam. The engine runs on 100-octane low-lead aviation gas, and it's lubricated with a mixture of 50 percent 5W30 Castrol oil and 50 percent Shaler Rislone additive. The coolant is a diluted solution of ethylene glycol.



Engineer and designer Dick Yeagley at work on his incredible Rolls-Royce Merlin. This project took Dick nearly 10 years to complete.

External coils fire the dual-ignition spark plugs, and a small electric starter with a 40:1 gear reduction turns it over. The engine turns a 17-inch, 4-blade prop at approximately 5,000rpm, but Dick has not yet opened it up all the way. The firing order duplicates that of the full-size engine.



Thousands of parts make up this engine. The twin distributors alone each have 69 pieces, and the 0.950-inch-diameter cap has 40 pieces. The points are made of tungsten. The largest "bolt" is a 1-72 with an outer diameter of 0.072 inch while the smallest is a 000-120 with a diameter of 0.034 inch.

There are no castings; Dick made all the parts from wrought metals. Aluminum alloys 2024-T6, 6061-T6 and 2011 were used to duplicate the full-size parts. The one-piece crankshaft and the camshafts were made from A-2 die steel. The cylinders, connecting rods, valves, valve seats, valve guides and rockers were all made from Zero One tool steel. All of these ferrous parts were heat-treated.

The camshafts turn in a combination of bearings: phosphor-bronze on top and 2024 aluminum on the bottom. There are phosphor-bronze bearings on the crankshaft and connecting rods as well. Several ball bearings were also used in locations with thrust loads, and a needle bearing is mounted on the prop shaft.

Dick notes that he did all of the machining in his shop with lathes, grinders and milling machines. Some of the more intricate parts were made by Electro Dynamic Electric Discharge Machining.

As far as I know, this working miniature Merlin engine has no equal anywhere in the world. It is indeed a technical masterpiece that's admired by all who see it. ✈